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VOL. XXXIII FEBRUARY 1954

HOLLAND (A. H.), KENDRICK (J. B.), LANGE (W. H.), & MACGILLIVRAY (J. H.). **Production of green Lima Beans for freezing.**—*Circ. Calif. agric. Ext. Serv.* 430, 22 pp., 5 figs., 1953.

This circular includes a section (pp. 9–12) describing the symptoms, cause, and control of the diseases attacking Lima beans [*Phaseolus lunatus*: *R.A.M.*, 24, p. 349] in California, grouped under seed and seedling decays [32, p. 602], root rots [32, p. 416], foliage blights, and virus diseases. Of the root rots *Sclerotium rolfsii* may cause considerable damage in some instances. It is liable to occur in warm weather where Lima beans are planted together with or following sugar beet, which is known to introduce the disease into previously uninfected areas. Infested fields should not be sown with Lima beans for four to five years after a susceptible crop. *Pythium aphanidermatum* invades the stem at soil level and progresses upwards into the plants. It is most common on baby Lima types. Curly top [beet curly top virus: 11, p. 219] is present to a small extent nearly every year. The young leaves cup downwards, tend to twist, and are smaller than normal, but there is no apparent mottling. The distortion becomes less noticeable as new growth is produced.

VENKATARAYAN (S. V.) & DELVI (M. H.). **Black mould of Onions in storage caused by Aspergillus niger.**—*Curr. Sci.*, 20, 9, pp. 243–244, 1 fig., 1951.

Aspergillus niger was found on stored onions [cf. *R.A.M.*, 31, p. 476] imported into Bangalore in 1951. It caused losses in store of up to 30 per cent. The disease, which has not previously been recorded in India, attacked both red and white varieties, the latter being more susceptible, and was transmitted by mites [cf. 11, p. 522], which feed on the spores.

SINGH (B.) & MATHUR (S. C.). **Sclerotial root-rot disease of Groundnut in Uttar Pradesh.**—*Curr. Sci.*, 22, 7, pp. 214–215, 1 fig., 1953.

During the 1951 and 1952 pot and field trials for the control of groundnut root rot (*Sclerotium rolfsii*) [*R.A.M.*, 30, p. 405] at the Laboratory of the Government Plant Pathologist, Kanpur, Uttar Pradesh, the selections T6–2, 11–11, 14, 16–4, 17, 19, 22, 24, 25, and 4201 maintained their resistance [loc. cit.], while T1 and T15 were slightly susceptible (below 2 per cent. infection). The susceptible check varieties R3, R7, and T218 showed 27, 10, and 9 per cent. infection, respectively.

GIBSON (I. A. S.) & CLINTON (P. K. S.). **Pre-emergence seed-bed losses in Groundnuts at Urambo, Tanganyika Territory.**—*Emp. J. exp. Agric.*, 21, 83, pp. 226–235, 1953.

Field observations carried out between 1949 and 1951 in the Urambo region of the Overseas Food Corporation showed that pre-emergence seed-bed losses of

groundnuts were between 30 and 50 per cent. of seed sown. There was a close relation between seed injury, mostly due to mechanical decortication, and failure to emerge. Fungi isolated from sown seed before emergence included *Aspergillus niger* [*R.A.M.*, 31, p. 320] and other *A.* spp., *Penicillium* spp. [27, p. 171], and *Rhizopus* spp. [27, p. 172], among which *R. stolonifer*, *R. arrhizus*, and *R. oryzae* were identified. *R. stolonifer* and *R. oryzae* caused rotting of groundnut seeds on agar and *R. stolonifer* was pathogenic to seedlings up to four days old. Seed treatment with agrosan GN at 4 oz. per cwt. seed, or with other organo-mercurials gave adequate protection against pre-emergence rotting.

Davis (G. N.), Whitaker (T. W.), & Bohn (G. W.). **Production of Muskmelons in California.**—*Circ. Calif. agric. Ext. Serv.* 429, 38 pp., 15 figs., 1 map, 1953.

This circular describes all the necessary requirements for the successful culture of muskmelons, cantaloupes, and winter melons (*Cucumis melo* and its vars. *reticulatus*, *cantaloupensis*, and *inodorus*) in California, and supersedes *Circ.* 352. The section on diseases and their control (pp. 31–38) deals with seedling and leaf diseases, root rots, vascular wilts, fruit rots, and virus diseases. A new variety resistant to powdery mildew [*Erysiphe cichoracearum*: *R.A.M.*, 27, p. 308; 32, p. 360], cantaloupe No. 6, was released in 1944. This variety has good consumer and shipping characteristics and is resistant to races 1 and 2 of the mildew. Two new sulphur-resistant varieties have been synthesized, V–1 and SR–91, which can be grown in areas where *E. cichoracearum* is prevalent.

Rosberg (D. W.). **Association of a strain of the Tobacco ringspot virus with pimples disease of Watermelons in Texas.**—*Plant Dis. Reptr*, 37, 7, pp. 392–396, 6 figs., 1953. [Multilithed.]

Watermelon pimples disease, sometimes referred to as bumps, measles, sandbumps, or warts, has increased annually in Texas during the last few years. The symptoms are macroscopically similar to the early fruit lesions of anthracnose (*Colletotrichum lagenarium*) [*R.A.M.*, 32, p. 298], with which it is often confused. In September, 1952, young Burley tobacco plants were inoculated at the Department of Plant Physiology and Pathology, Texas A and M College, by rubbing with sap from the pimpled rind of Black Diamond (= Florida Giant) watermelons. Ten days later chlorotic and necrotic ringspots developed on the leaves followed by an oak-leaf pattern. In greenhouse experiments during the winter typical symptoms appeared after four to seven weeks on the fruits of four of the 24 watermelon plants leaf-inoculated with sap from infected tobacco. The virus isolated from pimpled watermelons appears to be closely related to the yellow strain of the tobacco ringspot virus [29, p. 135], though non-infective to petunia. The fact that, in Texas, many watermelon plants with pimpled fruits otherwise appear symptomless may be due to the masking effect of high temperature [cf. loc. cit.].

Venkatarayan (S. V.) & Venkatakrishniah (N. S.). **New hosts of the downy mildew of cucurbits in India.**—*Curr. Sci.*, 22, 6, pp. 183–184, 1953.

Pseudoperonospora cubensis was observed on the following hosts near Bangalore, India, in 1952: cucumber, watermelon, melon, and *Lagenaria vulgaris* [cf. *R.A.M.*, 19, p. 567].

Amphoux (M.). **Les traitements du mildiou de la Vigne.** [The treatment of Vine mildew.]—*Motoris. agric.*, 8, 79, pp. 217, 219, 221–222, 1953.

This article, written at the time of the fourth demonstration of motorized equipment used in viticulture at Montpellier, France, discusses the control of vine mildew [*Plasmopara viticola*: *R.A.M.*, 32, p. 361] by sprays.

The techniques currently employed are (*a*) mechanical spraying at low or medium pressure (2 to 8 or 10 kg.) at 600 to 1,200 l. per ha., or at high pressure (15 to 50 kg.) at 400 to 800 l. per ha.; (*b*) atomization by means of pneumatic sprays at 200 to 500 l. per ha. requiring fairly high motive force, or by the Pintagram formula requiring less than 100 l. per ha. highly concentrated spray and less motive force, or with aerosols; and (*c*) foam mist.

Bearing in mind that different regions have to adapt given recommendations to their own conditions the author indicates the following basic principles to be observed: (*a*) frequent treatments whatever the soil type or weather conditions, with a view to covering the new leaf surface not protected by the previous treatment, i.e., every two or three days on humid plains where vegetation is luxuriant, every four to six days on hillsides of normal fertility, and every ten to 12 days in dry or arid regions where growth is retarded; (*b*) applying materials that are safe to handle and give good coverage by means of an apparatus which performs this best in the shortest time and all at the smallest possible cost. He then amplifies each recommendation and attempts to reconcile those that at first glance appear incompatible in practice.

As pneumatic sprayers permit a wider diffusion of the fungicide they are considered preferable to all forms of the popular mechanical applicator (under 10 kg. pressure) and comparable with high pressure equipment (over 25 kg.). It is advisable, however, that the spray volume on a given surface should amount to not less than 30 or 40 per cent. of the quantities usually employed by ordinary spray machines and that the active ingredient should be supplemented as the volume decreases.

JENNINGS (J. P.). **Grapevine anthracnose. Relative susceptibility of varieties.**—*J. Dep. Agric. S. Aust.*, 57, 1, p. 23, 1953.

Severe infection by vine anthracnose (*Elsinoe ampelina*) [*R.A.M.*, 33, p. 11] developed during the 1952–3 season on the vine variety collection (80 varieties) at the Nuriootpa Viticultural Station, comprising most of the vine varieties grown in South Australia. Those not infected were Cornelian, Gouais, White Madeira, Knight's Centennial, White Hermitage, Royal Ascot, Gros Colman, Black Hamburgh, Black Trentham, Riesling (Rhine), Shiraz, Red Labrusca, Bucklands Sweetwater, Parsley Leafed Chasselas, Royal Muscadine (Golden Chasselas), Pride of Australia, Aramon, White Tokay, Cabernet sauvignon, and Cabernet gros.

MATTHEWS (R. E. F.). **Chemotherapy and plant viruses.**—*J. gen. Microbiol.*, 8, 2, pp. 277–288, 1 pl., 1953.

This is a full account of work carried out at the Plant Diseases Division, Auckland, New Zealand, which has already been noticed from other sources [*R.A.M.*, 30, p. 447; 31, p. 318]. Guanazolo did not affect infectivity when incubated with lucerne mosaic virus *in vitro*. Concentrations up to approximately 0·005 M caused negligible plant damage generally but higher levels produced slight yellowing and distortion of the young leaves and general stunting if treatment was prolonged. The triazolo analogue of adenine [loc. cit.] was extremely phytotoxic and only slightly inhibitory. The hypoxanthine analogue, which caused no damage, was less effective than guanazolo in White Burley tobacco and *Nicotiana glutinosa* but more effective in reducing the number of local lesions produced in Sydney Wonder beans (*Phaseolus vulgaris*). Guanazolo watered on the soil gave some measure of control of cucumber mosaic virus introduced into cucumber plants by *Myzus persicae*.

THOMAS (H. R.). **Isolation of Alfalfa mosaic virus strains from field-grown Beans.**—*Plant Dis. Reptr*, 37, 7, pp. 390–391, 1 fig., 1953. [Multilithed.]

Of 11 virus collections from bean (*Phaseolus vulgaris*) plants with symptoms

resembling those caused by bean yellow mosaic virus [*R.A.M.*, 32, p. 663], four (three from the Twin Falls, Idaho, area and one from Prosser, Washington) were found at Beltsville, Maryland, in 1952, to belong to the lucerne mosaic virus group [loc. cit.]. All four caused systemic infection in beans. On inoculated leaves of the Michelite variety a few large, local lesions and veinal necrosis developed, followed by stem necrosis, mild systemic mottle, and some yellow spotting. On Bountiful a few local, necrotic lesions and small necrotic bands along the veins were followed by mild mottle and yellow spotting of the trifoliate leaves. A reddish-brown pod blemish on Top-crop plants inoculated with the isolate from Prosser resembled that on the field plants from which the isolate was obtained. All four isolates produced necrotic, local lesions but were not systemic in tepary bean (*P. acutifolius* var. *latifolius*), whereas the remaining seven collections, belonging to the bean yellow mosaic group, caused veinal necrosis and later systemic mottle or necrosis; this is a useful host for distinguishing the two viruses. On Turkish tobacco leaves lucerne mosaic virus produced indistinct, chlorotic, local lesions followed by pronounced systemic mottle, often accompanied by white oak-leaf patterns, the symptoms disappearing as the plants grew older; stem streaking and stunting developed on Wisconsin Perfection pea, and systemic mottle on Blackeye cowpea, *Datura stramonium*, and zinnia.

It is suggested that strains of lucerne mosaic are responsible for some of the leaf mottling and possibly the reddish-brown blemish observed on snap beans in the field.

The Watermark Disease (Essex) Order, 1953.—*Quart. J. For.*, 47, 3, p. 205, 1953.

This Order, which came into force on 1st April, 1953, revokes the Watermark Disease (Essex) Order of 1938 and authorizes the Essex County Council and certain other local authorities to appoint officers to mark willow [*Salix*] trees affected by watermark disease [*Erwinia salicis*: *R.A.M.*, 29, p. 588] and any parts thereof. Notice requiring the destruction of infected stock may be given; penalties for non-compliance are provided.

Harris (R. V.). **Plant pathology.**—*Rep. E. Malling Res. Sta., 1951*, pp. 40–42, 1952; *1952*, pp. 34–38, 1953.

In the first report [cf. *R.A.M.*, 31, p. 171] it is stated that the study of possible saprophytic stages in the seasonal cycle of *Pseudomonas mors-prunorum* [32, p. 631] was aided by the development of a selective medium for isolating it from sparse populations.

In primary trials of 36 new hop seedlings some were highly resistant to *Verticillium albo-atrum* [32, p. 399] and will be propagated for further trial. Of the older seedlings OR 55 (Keyworth's Midseason) continued to show in 1950 and 1951 a progressive diminution with increasing age in the proportion of hills developing wilt symptoms.

Indexing experiments with cherry viruses, started in 1950, showed that although peach, apricot, and Mazzard, Morello, and Mahaleb cherry are good indicators of the necrotic ring spot or tatter leaf group [31, p. 558], none is better than the F12/1 Mazzard for the other groups. Three pear viruses were distinguished by using quince seedlings as indicators. In greenhouse inoculation tests symptoms of stone fruit viruses appeared on very young seedlings within one month of inoculation.

In 1952 the importance of inoculum concentration in determining infection through leaf scars by bacteriosis of stone fruits (*P. mors-prunorum*) was confirmed. Much higher concentrations were needed to establish a given level of infection in a resistant than in a susceptible variety. The relationship between time of inoculation and level of infection supported the conclusion from a field comparison of bactericides that the timing of the autumn spray treatment might profitably be

re-examined. It was confirmed that in autumn more concentrated inoculum is available on the leaves of a susceptible than of a resistant variety. In these leaf surface populations of the pathogen was a saprophytic bacterium which may influence the inoculum potential and thus the level of leaf scar infection.

Certain derivatives of the phenolic fractions of apple and pear sap markedly stimulated or inhibited the growth *in vitro* of the scab pathogens (*Venturia* [*inaequalis* and *V. pirina*]), the precise influence varying with the host source and concentration of the constituent, the species and strains of the pathogens [33, p. 34], and certain elements in the nutrient substrate.

Hop varieties resistant to *Verticillium* wilt are grouped as follows: (*a*) the Wye varieties bred primarily for cultural and brewing characters, found to be resistant, and now in a comparatively advanced stage of testing and production; (*b*) East Malling seedlings of the C, D, and J series, derived from open-pollinated seedlings of the Wye series and other resistant seedlings, already entered, or about to enter on large-scale resistance and cultural trials; and (*c*) the Wye-East Malling seedlings bred specifically for resistance as a joint project with the Hop Research Department of Wye College and given their primary selection tests at East Malling during the year. Work in 1952 was concentrated largely on groups (*b*) and (*c*). A very low proportion of wilt was recorded in farm trials of seedlings C_2, D_1, and D_3. Seedling J_2, which has shown moderate resistance in small-scale tests, was propagated intensively during the year. Of 2,000 group (*c*) seedlings undergoing their first resistance test, 600 remained entirely free from wilt; about 200 will be entered again next year. Mosaic virus in Fuggle hops [32, p. 278] was inactivated by heat treatment of nodal cuts of layered bine.

Each separate strain of apple mosaic virus [31, p. 440 and below, p. 88] was demonstrated to have a distinct range of varietal sensitivity or tolerance. A virus from a Malling II rootstock showing a vein-clearing symptom induced chlorotic leaf symptoms on apple, but failed to produce any recognizable symptom in other rootstocks.

Indexing studies have shown that some cherry varieties are virtually symptomless carriers even of the more severe viruses and that rusty mottle [31, p. 558] is very widespread in many varieties with and without symptom expression.

An additional vector of gooseberry vein-banding virus [see below, p. 97] was discovered. No symptoms developed on black and red currant seedlings inoculated with the virus.

Apple mildew [*Podosphaera leucotricha*: see below, p. 91] has increased considerably in severity in some areas recently, particularly where lime sulphur has been replaced by other sprays in the post-blossom routine schedule. SR 406 [captan] and a glyoxalidine preparation have given the most satisfactory control of apple and pear scab so far [loc. cit.].

Annual Report, Cawthron Institute, Nelson, New Zealand, 1951–52.—42 pp., [?1952].

In this report [cf. *R.A.M.*, 30, p. 362] it is stated that ground dolomite continues to give better control of magnesium deficiency of apples [loc. cit.; 32, p. 667] than either magnesite or magnesium sulphate. It completely cured trees which were formerly seriously deficient and is proving beneficial to the growth of young trees after replanting. Raspberries at Rakau have benefited from copper sprays or soil applications of copper sulphate.

Symptoms of black root rot (*Phytophthora cactorum*) [31, p. 20] appeared on Californian hop plants earlier than usual. It was detected in six gardens not previously infected at Neudorf and Blackbird Valley and in two at Motueka and Riwaka. The sites were all damp and low-lying. So far, in the control plots set up in the 1948–49 season, only one out of eight plants treated with DD has died from

black root rot. In a new set of replicated plots at the Hop Research Station, heavily inoculated with *P. cactorum* and treated with DD, chloropicrin, calcium cyanamide, and capsine, no symptoms have been observed so far. The varieties Fuggle and Golding have shown the most resistance when grown from seed in heavily inoculated soil. The theory that defoliation of green-bine plants may be due to a physiological disturbance is supported by a very high manganese content of the leaves and high soil acidity.

A survey of the fields of 21 tobacco growers revealed severe infection by black root rot [*Thielaviopsis basicola*] in several. Methyl bromide and chloropicrin gave almost 100 per cent. control in the seedling beds [32, p. 402]; chlorobromopropene and calcium cyanamide gave over 90 per cent. control. Severe root infection was reduced considerably by dressings of 10 cwt. sulphur per acre. In pot resistance tests Vamorr 48 sustained only light infection but Vesta 47, Oxford 1, and Oxford 3 were all heavily infected.

Mosaic [virus] was more prevalent in pricked out tobacco plants (16·1 per cent. infection) than in bed-sown ones (2·3 per cent.).

Finely divided sulphur and chlorobromopropene gave promising control of *Verticillium* disease [*V. albo-atrum*: 30, p. 21] in tobacco seed-beds. After examining cultures of the tobacco canker fungus the principal pathologist of the United States Department of Agriculture considered the causal organism to be *Phytophthora parasitica*, but not the strain associated with black shank (*P. parasitica* [var. *nicotianae*]) in the United States. Canker is more widely distributed in the Motueka district than was hitherto suspected. It is probably disseminated by the sharing of implements and workers by neighbouring growers.

Pathologie végétale. [Plant pathology.]—*Rapp. Inst. Rech. agron., Paris, 1949*, pp. 101–110, 4 figs., 1950. [Received September, 1953.]

In this report it is stated that *Lagena radicicola* on wheat is being studied in the lower Loire area, France, where its development is favoured by wet conditions.

In preventive dust treatments copper oxides proved superior to oxychlorides in controlling *Cercospora* [*beticola*: *R.A.M.*, 29, p. 11] on beet. Yield losses from black leg [*Phoma betae*: 8, p. 696] were 9 per cent. with an incidence of 3 per cent. and rose to 17 to 25 per cent. with poor culture, but these losses were nullified by dusting the fruit-clusters with an organo-mercurial containing 1·5 to 3 per cent. mercury [31, p. 266]; over 3·5 per cent. phytotoxicity was apparent. The damping-off organisms *Polyspora* [*lini*] and *Botrytis* [? *cinerea*] were particularly prevalent on flax during the dry weather of 1949, contrary to the general rule. Dusting colza seed with methoxybutylmercuric iodide and methoxypropylmercuric bromide gave good control of *Alternaria brassicae* [25, p. 416] which caused serious losses. Also effective were several thiram-based products, particularly one containing 30 per cent. thiram and trichlorodinitrobenzene.

At Versailles 1 per cent. sodium arsenite or sodium arsenate sprayed on to pear trees immediately before leaf fall prevented the formation of perithecia [of *Venturia pirina*: 29, p. 570] but the former scorched the branches.

A bacterium of the *subtilis* group [30, p. 59] produced substances active against *Endothia parasitica* and *Agrobacterium* [*Bacterium*] *tumefaciens* [cf. 31, pp. 395, 687].

The Plant Pathology Station, Antibes, contributes the following items. For two years citrus fruits have borne superficial brown spots caused by a bacterium resembling *B. citriputeale* [*Pseudomonas syringae*: 31, p. 183]. Rose mildew (*Peronospora sparsa*) is best controlled by verdigris [copper carbonate: cf. 31, p. 608] provided that the dose does not exceed 0·25 gm. per hl. at the commencement of plant growth (October) and 1 per cent. later on. Bacterial rot [strain of *Erwinia carotovora*: see below, p. 73] of arum lilies [*Zantedeschia aethiopica*] in the Hyères region was

controlled satisfactorily by cleaning the rhizomes and disinfecting them with organo-mercurial salts and copper dusts [cf. 31, p. 17].

Annual Report of the Agricultural Experiment Stations, Florida, for the year ending June 30, 1951.—277 pp., 30 figs., 1 diag., [? 1952].

In this report [cf. *R.A.M.*, 31, p. 541] E. West states that inoculation experiments carried out in Florida indicated that *Gloeosporium* sp. and *Phomopsis* sp. are not the cause of *Camellia* die-back [loc. cit.].

P. Decker reports that seed of yellow lupin selected in 1950 gave about 50 per cent. virus-affected plants [loc. cit.] in 1951, the percentage being about the same whether the seed was obtained from affected or apparently healthy plants. Work by C. W. Anderson indicated that two mechanically transmissible viruses may infect yellow lupins in central Florida. Tomatoes and tobacco in north-central Florida were affected by a disease resembling the curly top virus of tomato observed at Bradenton.

R. W. Earhart found that leaf spot (*Helminthosporium* [*Pyrenophora*] *avenae*) [28, p. 14] was present from emergence to harvest in all oat fields and nurseries inspected. In tests with 72 different isolates of the *Helminthosporium* causing culm rot of oats [30, p. 408], a new disease, in Alabama, South Carolina, and Florida, those from different localities varied widely in pathogenicity, whereas those from any one area varied only slightly. The fungus is closely allied to *H. sativum*. It was possible to distinguish the disease from Victoria blight (*H. victoriae*) by using Southland and Victorgrain as differential varieties. Inoculation tests demonstrated that wheat, barley, and rye can also be attacked; trials with 2,100 oat varieties and selections revealed sources of resistance.

H. N. Miller states that in the autumn of 1950 several plantings of maidenhair fern [*Adiantum* sp.] displayed severe leaf spotting, characterized by elongated necrotic lesions with circular to elongated grey centres and caused by a species of *Physalospora*. The disease spreads rapidly and usually causes 100 per cent. damage. Diseases of *Saintpaulia* and related plants studied included attack by *Sclerotium rolfsii*, leaf and crown rots due to a *Rhizoctonia* sp. [cf. 32, p. 382], and a root and crown rot caused by a *Phytophthora* sp. [loc. cit.]. All were controlled by growing the plants in sphagnum moss or in sterilized soil mixtures and practising strict sanitation.

A. H. Eddins reports that wettable spergon (4 lb. per 100 gals.), nabam-zinc sulphate (2 qts.–1 lb.–100 gals.), and 12 per cent. spergon wettable dust applied at intervals of two to three days for seven weeks gave good control of cabbage downy mildew (*Peronospora parasitica*) [33, p. 63] in beds where 40 per cent. of the foliage of untreated seedlings was killed by the disease. About 1,000 acres of land in the Hastings area are severely infested with cabbage yellows (*Fusarium oxysporum* f. *conglutinans*) [*F. conglutinans*: 32, p. 294]. When grown in affected soil the varieties Resistant Glory, Resistant Detroit, and Medium Copenhagen Market Resistant developed, respectively, 1·6, 6·6, and 8·2 per cent. infection, compared with 61·9 and 82·9 per cent., respectively, for the susceptible Glory of Enkhuizen and Copenhagen Market No. 86. Cauliflower whiptail [molybdenum deficiency: cf. 32, p. 600], severe in plants grown in soil of pH 4·4 to 4·6, was almost eliminated by adjusting the pH to 5·2 with hydrated lime or by spraying the seedlings (1 in. high) with ammonium molybdate solution at 0·35 lb. in 200 gals. water per acre. Grown in molybdenum-deficient soil Snowball A, Holland Erfurt, and Snowball X developed, respectively, 55·3, 19·6, and 2·5 per cent. whiptail.

E. N. McCubbin states that mild symptoms of boron deficiency appeared in 13·4 per cent. of Snowball X cauliflowers [cf. 32, p. 463] grown in soil of pH 5·2 without borax. When 10 lb. of borax were added to the fertilizer and the soil pH was adjusted to 5·4 only 1·1 per cent. of the plants became affected; at pH 4·8 the

percentage was 10·6. Snowball A was less susceptible to boron deficiency than Snowball X.

G. K. PARRIS reports that the Ironsides watermelon variety [31, p. 362] has shown too much hollow heart to be accepted by commercial growers for rail transport. The large Cannon Ball (Black Diamond) type [30, p. 453] has been named Orton; its resistance to *Fusarium oxysporum* [*F. bulbigenum*] var. *niveum* [32, p. 661] is 70 to 75 per cent. Sporangia of *Pseudoperonospora cubensis* [32, p. 299] were preserved in a viable, infective state by quick-freezing affected leaves at −30° to −33° C. and storing at −15° to −18°. Gummy stem blight [*Mycosphaerella citrullina*: 30, p. 505] attacked commercial fields in 1951; zineb gave excellent control.

E. A. WOLF and W. A. HILLS state that several cantaloupe plants in two F_3 lines from Smith's Perfect × Powdery Mildew Resistant No. 5, grown at Lake Worth Field Laboratory, were highly resistant to both *P. cubensis* and *Erysiphe cichoracearum*. D. G. A. KELBERT reports that several Gulf Coast Experiment Station lines display marked resistance to *P. cubensis*; Smith's Perfect was also resistant, followed by the Weslaco selections C, B, and H. The cucumber varieties Palmetto, SC-10, and SC-11 were equally resistant to *P. cubensis*.

In fungicide tests by G. SWANK significantly better control of *Alternaria* leaf spot of crucifers [*A. brassicicola*: 30, p. 452] in the field was given by spraying with manzate, dithane D-14, tribasic copper sulphate (with and without p.e.p.s.), ziram, ferbam, and z.a.c. than with dithane Z-78 or bioquin, while the best dust was 12 per cent. spergon (five applications at 20 to 35 lb. per acre). Manzate gave almost complete control of *P. cubensis* on cucumber, while dithane D-14, dithane Z-78, and parzate were almost equally effective. Leaf damage to escarole [endive] by *A. lactucae* in early plantings was controlled by five applications of ziram at five-day intervals. *Phytophthora capsici* [31, p. 274], severe in some seed-beds and early-planted fields of [chilli] pepper, was controlled by fixed coppers and nabam. Ziram, zineb, ferbam, and fixed coppers are recommended for the control of *Cercospora apii* on celery [30, p. 95; 32, p. 327] in central Florida. Small okra [*Hibiscus esculentus*] plantings in the Lake Monroe area were very severely attacked by *Ascochyta abelmoschi* [cf. 31, p. 366]. A hitherto undescribed virus was present in all [chilli] pepper plantings in the Sanford-Samsula area, producing a green and yellow mottled ring pattern on the leaves. In some fields, affected plants were stunted and did not set fruit.

Sclerotinia sclerotiorum caused greater damage to vegetables [32, p. 657] than in any previous year reported, particularly in the Zellwood area. R. A. CONOVER, working in co-operation with W. D. MOORE, found that the disease was reduced in tomatoes [33, p. 56] by staking and spraying with zineb.

R. F. SUIT and C. R. STEARNS record that satisfactory control of citrus melanose [*Diaporthe citri*: 31, p. 543] was given by Bordeaux mixture, copper sulphate plus lime-sulphur, copofilm, cop-o-zink, and copper oxide.

R. K. VOORHEES, W. T. LONG, and H. J. REITZ found that many Valencia orange trees at the Indian River Field Laboratory are affected by a decline characterized at first by a crinkly leaf condition resembling crinkly leaf psorosis of lemon trees in California [23, p. 62]. A year or more after the appearance of the leaf symptoms affected trees tend to produce a short, bunchy type of growth and the tops start to die back. The trees appear thin and stunted and the mature fruit remains small. The condition is probably a form of psorosis.

In further experiments by E. F. HOPKINS and K. W. LOUCKS on the control of citrus fruit decay by the dowicide A-hexamine method [31, p. 543] the percentages of decay control during two weeks' storage at 60°, 70°, 80°, and 90° F. were, respectively 100, 89, 75, and 35. Reducing the storage temperature from 70° to 65° improved control, though decay in the untreated lots was unaltered. The

addition of sodium chloride and sodium acetate to the fungicide may improve its efficacy.

W. N. Stoner and F. V. Stevenson found that zineb (2 lb. per 100 gals.) applied twice weekly gave promising control of *Helminthosporium turcicum* on maize [cf. 32, p. 327]. In an experiment by J. M. Walter the best control on a heavily infested crop was given by 15 applications (every three days) of parzate (120 gals. per acre) with which DDT 50-W was combined on 11 occasions; zineb and nabam gave economic control with increased yields that more than covered the costs of spraying.

R. O. Magie and W. G. Cowperthwaite state that the following gladiolus varieties were resistant to *Fusarium oxysporum* f. *gladioli* [31, p. 435] and *Curvularia* [*lunata*: 32, p. 433]: Carrara, Columbia, Evangeline, Lipstick, October Sunshine, Pacifica, and White Wings. R. O. Magie reports that treatments beneficial in suppressing corm rot due to *F. oxysporum* f. *gladioli* [31, p. 119] were: soaking the new corms for 15 minutes in dowicide B (3 lb. in 50 gals.); dusting with wettable spergon powder or a mixture of spergon, dow 9 B, and DDT (2–1–1); soaking for 10 minutes in a mixture of dowicide B, spergon, and new improved ceresan (3–4–½lb. in 50 gals.). Chloropicrin (water seal) and chlorobromopropene (CBP-55) appeared to eliminate the fungus from the soil. In spring, during prolonged moist weather, plants may be killed or stunted by a dry neck rot. Dark brown areas several inches long and small depressed brown spots develop on the inner and outer leaves of the neck region. Isolations constantly yielded a *Fusarium* sp., differing from *F. oxysporum* f. *gladioli*, and bacteria. Bacterial blight (*Xanthomonas gummisudans*) [cf. 20, p. 468] was epidemic for the first time in Florida in 1949, affecting the Spotlight variety at Zellwood. A new virus-like disease of gladiolus was observed in 1949 and 1950 on four farms in Lee, Manatee, and Hillsborough counties. The petals were small and wrinkled and had green veins, the plants and flower spikes were stunted with a mosaic mottle, and the flowers opened incompletely or not at all. The name 'green petal streak' is suggested. Other virus-like diseases of gladiolus included stunt, not previously recorded in Florida.

R. R. Kincaid states that in conditions highly favourable to infection excellent control of blue mould [*Peronospora tabacina*: cf. 32, pp. 368, 614] on cigar-wrapper tobacco plants was given by dithane Z-78 and parzate dusts (6·5 per cent. zineb) diluted with pyrophyllite, dilvex, or tobacco dust. Among new fungicides tested, manganese ethylene bisdithiocarbamate (7 per cent. active) showed promise. W. C. Rhoades and R. R. Kincaid state that potato vein-banding virus [virus Y] appeared in tobacco plots where the control of *Myzus persicae* was inadequate [cf. 30, p. 453]. When aphids were transferred from infested to healthy tobacco plants the latter developed characteristic symptoms within two weeks.

In a field test by G. D. Ruehle on the control of potato blight (*Phytophthora infestans*) [32, p. 327], sprays being applied nine times at weekly intervals, excellent results were given by zineb and by nabam plus zinc sulphate; captan was only slightly less effective. R. A. Conover found that good control of *P. infestans* on tomato [cf. 33, p. 55] was given by sprays of manganese ethylene bisdithiocarbamate, captan, parzate, dithane Z-78, phygon XL, and nabam-zinc sulphate.

Hingorani (M. K.) & Addy (S. K.). **A comparative study of Erwinia carotovora, Erwinia aroideae, and Erwinia atroseptica.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 40–43, 1 fig., 1953.

A comparative study at the Indian Agricultural Research Institute, New Delhi, of authentic cultures of *Erwinia carotovora*, *E. aroideae*, and *E. atroseptica*, all from the Indian Type Culture Collection, and soft rot isolates of *Erwinia* [*R.A.M.*, 33, p. 18] from potato and onion indicated that they may be conveniently separated into two species, viz., *E. carotovora* and *E. atroseptica*, on the basis of fermentation

reactions and pathogenicity. The latter species differs from the former in being able to produce acid and gas from maltose and unable to assimilate ethanol and glycerol. It was the only isolate able to produce typical black leg symptoms in young Phulwa potato plants [32, p. 642] inoculated by stem injury and to infect healthy tubers by means of the cutting knife. *E. aroideae* is considered to be a non-gas-forming strain of *E. carotovora* [29, p. 502]. The other two isolates corresponded biochemically to *E. carotovora*.

PATEL (M. K.), KULKARNI (Y. S.), & DHANDE (G. W.). **Three bacterial diseases of plants.**—*Indian J. agric. Sci.*, 23, 1, pp. 41–46, 2 pl., 1953.

This paper dealing with *Xanthomonas betlicola* on *Piper betle*, *X. stizolobiicola* on *Stizolobium deeringianum* [*Mucuna deeringiana*], and *X. begoniae* on several varieties of begonia in India is an expanded account of that already noticed from another source [*R.A.M.*, 31, p. 107].

HIRAI (T.). **Studies on the snow-blight diseases of winter cereals. IV. Increased viscosity of protoplasm in the starved cells.**—*Forsch. PflKr., Kyoto*, 4, pp. 133–137, 2 diags., 1951. [Japanese, with English summary. Received 1952.]

From experiments which showed that the protoplasm in the cells of starved wheat plants is more sluggish and more easily plasmolysed than that of healthy cells, it is concluded that the linked series of cellular changes associated with weakening of plants under snow-cover [*R.A.M.*, 32, p. 370] may be summarized as follows: breakdown of carbohydrates leads to breakdown of protein which in turn causes increased viscosity and decreased permeability of the protoplasm.

OSWALD (J. W.) & HOUSTON (B. R.). **The yellow-dwarf virus disease of cereal crops.**—*Phytopathology*, 43, 3, pp. 128–136, 2 figs., 1 graph, 1953.

In addition to information already presented on yellow dwarf virus of cereals in California [*R.A.M.*, 31, pp. 233, 597], this expanded account comprises full descriptions of the symptoms on barley, oats, wheat, and rye, together with some observations on varietal reactions and effects on yield [see next abstract].

The one rye variety examined (Merced) exhibited little if any stunting and no discoloration in fields where the other cereals sustained heavy damage. In greenhouse inoculation tests, too, rye was highly resistant. The barley varieties C.I. 1227, C.I. 1237, C.I. 2376, and Abate were rated as highly resistant, Hannchen as tolerant, and Club Mariout, Tennessee Winter, and Blackhulless as extremely susceptible. Kanoto and Bond oats were tolerant and Victoria and California highly susceptible. Among field wheat crops Sonora 37 appears to be the most tolerant, while the widely cultivated varieties Baart 46, White Federation 38, and Ramona are very susceptible.

In all the affected cereals (except rye) seedling infection results in much heavier yield reductions than subsequent attacks. For instance, in the barley varieties Atlas 46, California Mariout, and Club Mariout the reduction from natural infection at the seedling stage in plantings made in November, 1951, was estimated at 95 per cent.

OSWALD (J. W.) & HOUSTON (B. R.). **Host range and epiphytology of the cereal yellow dwarf disease.**—*Phytopathology*, 43, 6, pp. 309–313, 2 figs., 1953.

The cereal yellow dwarf virus was shown by further studies at the Department of Plant Pathology, University of California, Davis [see preceding abstract], to have a wide host range in the grass family. Of 55 grasses inoculated, 36 species representing eight tribes of the Gramineae proved to be susceptible, 20 displaying more or less pronounced stunting and yellow or red foliar discoloration, while 16 carried the virus in a masked form, and the remaining 19 were immune. The 20

with symptoms comprised *Bromus catharticus*, *B. inermis*, *B. mollis*, *B. rigidus*, *B. rubens*, and *B. tectorum*, *Cynosurus echinatus*, *Festuca myuros*, *F. reflexa*, *Aegilops triuncialis*, *Hordeum hystrix*, *H. leporinum*, *H. brachyantherum*, *Sitanion hystrix*, *Avena barbata*, *A. fatua*, *Aristida oligantha*, *Gastridium ventricosum*, *Phalaris paradoxa*, and *Andropogon barbinodis*, and the symptomless carriers *Dactylis glomerata*, *F. arundinacea*, *Poa annua*, *P. pratensis*, *Agropyron trachycaulum*, *Elymus caput-medusae*, *E. triticoides*, *Lolium multiflorum*, *Phalaris tuberosa*, *Anthoxanthum odoratum*, *Bouteloua curtipendula*, *Chloris gayana*, *Cynodon dactylon*, *Panicum capillare*, Sudan grass, and sorghum (Double Dwarf milo 38). Widely grown among the symptomless grasses are *C. dactylon*, *D. glomerata*, *F. arundinacea* (Kentucky fescue 31), and *Poa pratensis*. The natural winter and spring range growth in the State consists principally of susceptible species, while a considerable proportion of those found in summer-irrigated pastures are also hosts of the virus. The immune species included *Lolium perenne* (Perennial rye grass 12), *Phleum pratense*, *Agrostis alba*, Double Dwarf white sooner milo sorghum, and Golden cross bantam maize.

Severe epiphytotics of cereal yellow dwarf virus are promoted by a warm, continuously wet winter, favouring rank growth of wild grasses and rapid reproduction of the aphid vectors while simultaneously delaying grain planting until March; a sudden protracted drought after the rains, causing rapid drying of the grasses soon after the grain is sown; and large aphid flights from the drying grasses into very young grain fields. In 1950–1, when damage was extensive, aphids apparently flew from the grasses in late March and early April into grain planted after 1st March. In 1951–2 the disease was again widespread, but aphid flights from the grasses were deferred until late April when the December-planted grain was near the heading stage and losses were consequently slight. The eventual control of the disease lies in the development of resistant varieties.

Earhart (R. W.). **Reaction of Wheat varieties to Septoria nodorum in Florida.**—*Plant Dis. Reptr*, 37, 8, pp. 436–437, 1953. [Multilithed.]

Septoria nodorum [*R.A.M.*, 30, p. 605 and next abstract] infected every wheat planting in the south-eastern Coastal Plain, Florida, during the 1953 growing season. Leaves and leaf sheaths were primarily infected but only minor damage was observed on the glumes. The reactions of a number of wheat varieties and selections are tabulated. The most resistant, with class 1 or 1 to 2 infection on a scale 0 (no infection) to 10 (dead plant), were Coastal (C.I. 12463), Purplestraw (1915), Wabash × American Banner (12992), Malakof (4898), Minturki × Timstein-*vulgare* (13901), Kharkof (1442), and C.I. 12993.

Chona (B. L.) & Munjal (R. L.). **Glume blotch of Wheat in India.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 17–19, 1 pl., 1953.

In December, 1951, a severe attack of glume blotch (*Septoria nodorum*) [see preceding abstract] was observed on a summer crop of the local Samba wheat (*Triticum dicoccum*) in the Nilgiri Hills, southern India. The disease has not hitherto been reported in India. Hardly 5 per cent. of the plots yielded fertile ears. No infection was observed on other Samba varieties being grown as a winter crop.

Globose or subglobose perithecia found on withered leaves and leaf sheaths closely resembled those of *Leptosphaeria* [*R.A.M.*, 32, p. 246]; they measured 85 to 120 (mostly 105 to 112·5) μ in diameter, the asci 45·5 to 60 by 5 to 8 μ, and the ascospores 15 to 20 by 3 to 4 μ. Of 20 single ascospore cultures one developed typical pycnidia of *S. nodorum*. Confirmatory studies are in progress.

Glynne (Mary D.). **Wheat yield and soil-borne diseases.**—*Ann. appl. Biol.*, 40, 1, pp. 221–224, 1953.

Reviewing the results obtained in 15 years' study at Rothamsted Experimental

Station of wheat take-all (*Ophiobolus graminis*) [*R.A.M.*, 31, pp. 170, 429] and eyespot (*Cercosporella herpotrichoides*) [32, p. 618 and next abstract], most of which has been noticed in this *Review*, the author states that take-all, by reducing the yield of poorly nourished plants very much and of well nourished ones very little, increases the response in grain yield to fertilizers [loc. cit.]. In the field take-all is often controlled by one and generally by two years' freedom from wheat and barley, and even when wheat is grown continuously the effects of the disease are decreased by sound nutrition; the serious losses at present suffered in many parts of Great Britain are, therefore, unnecessary.

To prevent serious loss from eyespot two years' freedom from susceptible crops is required. In a long series of experiments control of the disease increased yields by 50 per cent. Eyespot reduces response to fertilizer because when severe it increases lodging. In rate of seeding experiments each additional bushel of seed increased lodging by about as much as an extra 2 cwt. of ammonium sulphate applied in March.

The consistent association in the field of high yield with low incidence of eyespot and take-all, taken in conjunction with the results of controlled experiments, supports the view that these diseases exercise a major effect on yield comparable with that exerted by fertilizer and by variety. Thus, when a high-yielding variety was grown at Rothamsted in a good rotation, with sound nutrition, yields exceeding 40 cwt. per acre were obtained, or about twice the average yield for Great Britain. If full use were made of the available knowledge it should be possible to increase the average yield of wheat in this country by at least 50 per cent.

Salt (G. A.). **A field experiment on Wheat infected with eyespot.** —*Ann. appl. Biol.*, 40, 1, pp. 224–225, 1953.

Two wheat varieties sown in October, 1951, on land infested with eyespot [*Cercosporella herpotrichoides*: see preceding abstract] at Rothamsted Experimental Station were sprayed with sulphuric acid (12½ per cent. B.O.V. by volume) at the rate of 100 gals. per acre on 14th March, 1952, to kill the weeds [cf. *R.A.M.*, 33, p. 14]. In Squarehead's Master the proportion of straws with severe eyespot was reduced from 66 to 17 per cent., the area lodged at harvest from 95 to 36 per cent., and the grain yield increased from 22 to 32 cwt. per acre; the corresponding figures for Bersee were 56 to 15 per cent., 54 to 1 per cent., and 33 to 44 cwt. per acre. An increase in yield of 3 cwt. per acre would have covered the cost.

Reducing the rate of seeding in both varieties from 3 to 1½ bush. per acre reduced severe eyespot in unsprayed plots by an average of 17 per cent. and in sprayed plots, where there was less eyespot, by 9 per cent., the yields being increased by 5 and 2 cwt. per acre, respectively. The application of ammonium sulphate had little effect on eyespot incidence but by increasing the weight of straw accelerated and increased lodging, the date of application determining the amount.

Futrell (M. C.). **The influence of greenhouse temperatures on the development of Erysiphe graminis tritici on Wheat seedlings.**—Abs. in *Phytopathology*, 43, 5, pp. 290–291, 1953.

The reaction of 15 spring wheat varieties to *Erysiphe graminis tritici* was studied in the greenhouse at temperatures of 16°, 20°, 24°, and 28° C. [cf. *R.A.M.*, 32, p. 672] during the late winter at Madison, Wisconsin, seedlings being dusted with conidia in the two-leaf stage. Susceptible varieties developed the most intensive infection at 20°, but there was little reduction of severity at 16° and 24°. Sturgeon (C.I. 11703) was more susceptible on the leaf sheath than on the lamina. Egypt (C.I. 12100) contracted a low percentage of type-4 infection, reaching a maximum on the leaf blade at 24°. The reaction of Hope (C.I. 8178) to powdery mildew was more influenced by temperature than that of other varieties, its leaf blades being

resistant at 16° and 20° but moderately susceptible at 24°. Mycelial development on the leaf sheath of Hope seedlings was also much less profuse at the two lower temperatures than at 24°. Khapli (C.I. 4013), *Triticum timopheevi*, and selections C.I. 12632 and C.I. 12633 from hybrids with the latter were highly resistant at all the temperatures tested.

Johnston (C. O.) & Levine (M. N.). **Physiologic races of the leaf rust of Wheat in the United States in 1952.**—*Plant Dis. Reptr*, 37, 8, pp. 438–439, 1953. [Multilithed.]

In co-operative investigations by the United States Department of Agriculture and the Kansas and Minnesota Agricultural Experiment Stations 26 physiologic races of wheat leaf rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: *R.A.M.*, 31, p. 10; 32, p. 672] were identified among uredospore collections received in 1952 from 28 States. Of these, race 5 (21·1 per cent. of the 852 isolates) was the most abundant and widespread, occurring in all areas but the south-western (California), followed by races 15 (16·3 per cent.), 58 (11·2), 11 (7·6), 122 (7), and 35 (4·7), the last two races, both virulent, having increased in abundance. Race 9 was significantly less prevalent (1·8 per cent.) than in previous years, while the related race 20 was more so (4·2).

Thorpe (H. C.). **A note on the release of new cereal varieties. IV.**—*E. Afr. agric. J.*, 18, 3, p. 99, 1953.

The new wheat variety No. 321, *BT.* 1. *B.* 1 has been released to farmers by the Department of Agriculture, Kenya, for sowing in the 1952–3 season [cf. *R.A.M.*, 31, p. 481]. It was selected from Australian 45.C.5×117 A. at the Plant Breeding Station, Njoro. It is resistant to the physiologic forms K1 to K7 and K11 of stem rust (*Puccinia graminis*) [32, p. 10] and has not been attacked by stem rust in the field. It resists *P. triticina* and *P. glumarum* at altitudes up to 7,000 ft. The new physiologic forms of stem rust recently recognized in East Africa are K11 in Kenya and Tanganyika isolated in 1950 and K12 in Kenya in 1951.

Lindfors (T.). **Utrotning av Berberis, svartrostens skålrostvärd, med natriumklorat.** [The eradication of Barberry, the aecidial host of black rust, with sodium chlorate.]—*Nord. JordbrForskn., 1951*, 2–3, pp. 473–477, 1951.

In addition to information already published, the author, in this paper read before the eighth Congress of the Scandinavian Agricultural Research Workers' Association, held in Helsinki in June, 1950, describes the results of experiments in Sweden from 1945 to 1949 on the control of cereal black rust [*Puccinia graminis*: *R.A.M.*, 32, p. 11] by the eradication of barberry with sodium chlorate [24, p. 12]. It was found, *inter alia*, that the standard mode of applying sodium chlorate (scattering evenly over the area covered by the crown) was as successful as the 'point method', in which the chemical is deposited exclusively between the stems of the bushes, while the 'ring method' (strewn in a circle round the periphery) gave unsatisfactory results.

Misra (A. P.). **Influence of the suspension of summer cultivation of Wheat and Barley on the incidence of black rust.**—*Indian J. agric. Sci.*, 23, 1, pp. 47–54, 1 map, 1953.

The development of black rust (*Puccinia graminis*) on wheat [*R.A.M.*, 32, p. 545] and barley in India during 1948 to 1951 occurred earlier in the south than elsewhere. The disease is very slight in the hills where the common, local Samba variety (*Triticum dicoccum*) is not affected. The crops in the Nilgiri and Palni Hills appear to be sources of infection which may spread to the foothills and the neighbouring

plains. Certain grasses, acting as collateral hosts of *P. graminis* [33, p. 31], and summer cereal crops in particular are important sources of infection. The scheme prohibiting summer cultivation of wheat and barley, enforced during the period, gave satisfactory results in 1950 and 1951 when little or no rust was observed in peninsular and central India and in parts of Rajasthan. This scheme may also prove effective against brown rust [*P. triticina*: 32, p. 179].

TYNER (L. E.). **The control of loose smut of Barley and Wheat by spergon and by soaking in water at room temperature.**—*Phytopathology*, 43, 6, pp. 313–316, 1953.

In this full account of experiments at the Laboratory of Plant Pathology, Edmonton, Alberta, Canada, it is stated that loose smut (*Ustilago nuda*) in the seed of several barley varieties [*R.A.M.*, 31, p. 600; 32, p. 664] was also effectively combated by immersion in water for six, eight, or ten hours followed by 40, 44, or 48 hours in 0·2 per cent. spergon suspension. The 56- to 64-hour water immersions resulted in a malodorous decomposition which was not evident in the spergon treatments.

At laboratory temperatures (72° to 77° F.) loose smut of wheat (*U. tritici*) was eliminated from seed of the Stewart variety by a 48-hour soak in water and by 24 hours' immersion in a 0·1 per cent. spergon suspension; the latter treatment, however, caused a heavy reduction in germination.

TAPKE (V. F.). **Further studies on Barley mildew as influenced by environment.**—*Phytopathology*, 43, 3, pp. 162–166, 2 figs., 1953.

Continuing his studies at the Plant Industry Station, Beltsville, Maryland, on the influence of environment on barley mildew (*Erysiphe graminis*) [*R.A.M.*, 30, p. 605; cf. above, p. 76], the author found that adult plants were as susceptible as seedlings when inoculated in the greenhouse during the early heading stage in December and January. The cool, moist soil and air and the short, subdued daylight prevailing from October to January induced great tenderness in the plants with consequent susceptibility. Conversely, the gradual toughening of the tissue effected by the longer, brighter, and warmer days of advancing spring resulted in progressive resistance to infection during the heading stage from February to May, inclusive. Seedlings inoculated during each of the foregoing periods were highly susceptible. Tender and toughened plants contracted heavy and light infection, respectively, when inoculated simultaneously at the heading stage and then placed in a controlled environment highly conducive to mildew development.

The four varieties used in the experiment differed in the degree of adult resistance gained by environmental conditioning [cf. 33, p. 23], which was higher in Alpha and White Smyrna than in Baku or Oderbrucker. Mature-plant resistance was expressed as a gradient infection in which the percentage of leaf area covered with mildew reached a maximum on the lowest leaf and decreased progressively up the plant. No correlation was demonstrated between the mildew gradient and different levels of atmospheric humidity.

KOEHLER (B.). **Ratings of some yellow Corn inbreds for ear rot resistance.**—*Plant Dis. Reptr*, 37, 8, pp. 440–444, 1953. [Multilithed.]

In field tests carried out at the Illinois Agricultural Experiment Station, Urbana, from 1939 to 1951, inclusive, to evaluate ear rot resistance of some yellow maize inbreds, Ill.R4 was still among those showing the greatest resistance to *Diplodia zeae* [*R.A.M.*, 32, p. 182], *Fusarium moniliforme* [*Gibberella fujikuroi*: loc. cit.], *G. zeae* [loc. cit.], and *Nigrospora oryzae* [30, p. 24]. This variety should be preserved in spite of its susceptibility to *Diplodia* stalk rot [*D. zeae*: 31, p. 61].

A significant correlation was observed between good husk coverage and low amounts of ear rot due to *D. zeae* and *G. fujikuroi*. The results, on the whole, indicate that the least amount of rot would be expected when an inbred transmits good physiological resistance combined with good husk coverage and declination of the ears towards horizontal, these features being in decreasing order of importance. Poor husk coverage combined with good resistance to *D. zeae*, as found in Ind. H10, or to *G. fujikuroi*, as in Tenn.T8, indicates outstanding physiological resistance.

Purss (G. S.). **Mould growth on Sorghum seed.**—*Qd J. agric. Sci.*, 10, 2, pp. 125–126, 1953.

Thiram and chloranil dusts (both at 1 oz. per bush.) were completely effective and agrosan (2 oz.) fairly so in preventing mould growth on sorghum seed from the southern Queensland crop in germination tests in 1952–3. Among the fungi isolated from infected seed samples were three species of *Alternaria* and single species of *Aspergillus*, *Rhizopus*, *Heterosporium*, *Helminthosporium*, and *Fusarium*.

Oak root fungus a problem in some orchards.—*Calif. Citrogr.*, 38, 10, p. 369, 1953.

Armillaria [*mellea*: *R.A.M.*, 31, p. 24; 32, p. 703], present in several localities in Ventura county, California, recently attacked lemon trees, ornamental shrubs, and a cypress [*Cupressus*] hedge west of Oxnard. It was killed by injecting carbon disulphide [31, p. 24] into dry soil in holes 18 in. apart and 8 to 12 in. deep at the rate of 2 oz. per hole. A moist soil surface prevents the gas escaping. A fumigated area at least 5 to 6 ft. beyond the outermost infection prevents spread for some time. Digging a trench beyond the root zone reduces spread from tree to tree. New trees should not be planted in the fumigated area for 20 to 60 days, until all traces of the gas have disappeared.

Rutherford (D. M.). **Trees on trial in Ventura county.**—*Calif. Citrogr.*, 38, 10, pp. 339, 356, 2 figs., 1953.

In pruning trials carried out by J. Newman in co-operation with E. C. Calavan in Ventura county, California, declined lemon trees [*R.A.M.*, 32, p. 555] pruned to 8 ft. or less and those in which the large limbs were sawn off at 8 to 9 ft. with no trimming of the skirt limbs showed improved fruit set and quality in comparison with trees treated less severely, which continued to decline. Pruning should be done well before midsummer as soon as the frost danger has passed and before there is any evidence of decline symptoms.

Sleeth (B.). **Winter Haven decline of Citrus.**—*Plant Dis. Reptr*, 37, 8, pp. 425–426, 1953. [Multilithed.]

A decline of citrus in Texas known as Winter Haven decline, first reported in 1947 from the Winter Garden district (*Proc. Rio Grande Valley hort. Inst.*, 2, pp. 84–87, 1947), has caused severe losses of trees ten years old or more and of several different rootstocks, particularly at the Winter Haven Experiment Station Farm. The disease first affects a single tree, and then spreads outwards. The first symptom is a dull green appearance of the leaves, followed by gradual defoliation and die-back. Sucker growth from the main trunk and the scaffold limbs may continue for four years before the tree dies completely. Of the 41 root and soil samples taken from the root-zone area of affected and adjacent healthy trees 38 yielded *Pythium ultimum* [*R.A.M.*, 22, pp. 305, 319]. Since the fungus appears to be active in this area in both winter and summer it may be partly responsible for the disease in combination with shallow soil and recurring periods of excessive and deficient soil moisture.

Oberholzer (P. C. J.). **Degeneration of our Citrus clones.**—*Fmg in S. Afr.*, 28, 326, pp. 173–174, 1953.

Stem-pitting disease, believed to be caused by the tristeza virus, has ruined nearly 40 per cent. of the grapefruit orchards in South Africa [*R.A.M.*, 30, p. 267; cf. 32, p. 554]. Other virus diseases, particularly psorosis [30, p. 268], cause degeneration and occasionally actual losses, though to a far smaller extent than tristeza. An undetermined decline has limited the commercial life of smooth-skinned lemons, such as Eureka, and Natal Tight Skin mandarins [32, p. 366] to about 15 years. In fact, so far, only sweet oranges, particularly Valencias, have shown no signs of serious clonal deterioration.

The remedy for tristeza appears to lie in using only rough lemon and sweet orange as rootstocks. Resistant material which may provide parent trees has been found in Marsh Seedless and Cecily grapefruit. Psorosis may be prevented by propagating only from parent trees which have been proved resistant and by destroying infected trees. Certain lemon bud mutations are more resistant to general degeneration. Finally, nurserymen should combine the use of scion wood obtained from dependable sources with strict selection of the proper stock material.

Turk (A.) & Messer (P. J.). **Green Lemon mold. Gaseous emanation products.**—*Agric. food Chem.*, 1, 3, pp. 264–268, 1 diag., 11 graphs, 1953.

In experiments at the Connor Engineering Corporation, Danbury, Connecticut, *Penicillium digitatum* produced ethylene [cf. *R.A.M.*, 30, p. 230], a powerful stimulant of respiration in lemons. A mutant of the mould, secured by ultraviolet irradiation, which failed to expedite the process, produced less total volatile material than the parent culture; there were significant qualitative chemical differences between the two emanations. The stimulatory action of *P. digitatum* on the respiration of healthy lemons may be reduced by purification of the air with brominated activated carbon, but may be done more satisfactorily by the diffusion of low concentrations of bromine (less than 50 p.p.m.) into the storage space and recirculation of this storage air through unbrominated carbon and back to the store.

Fraselle (J. V.). **Inspection phytosanitaire de quelques palmeraies du Mayumbe.** [Phytosanitary inspection of some Palm plantings in Mayumbe.]—*Bull. agric. Congo belge*, 44, 1, pp. 75–90, 1953. [Flemish summary.]

A full account is given of various abnormalities of physiological origin presented by oil palms growing at Mayumbe, Belgian Congo, including Wardlaw's 'plant failure' [*R.A.M.*, 30, p. 318]. The frequency with which these physiological troubles occur locally indicates that limiting ecological conditions are quickly reached at Mayumbe.

Castaño (J. J.). **La 'llaga macana' o 'cancer del tronco y de los tallos del Cafeto'. Un resumen de las investigaciones sobre esta enfermedad.** [The 'sabre wound' or 'trunk and shoot canker of the Coffee bush'. A summary of investigations on this disease.]—*Agricultura trop.*, 9, 5, pp. 39–47, 6 figs., 1 diag., 1953.

This is a survey of recent, published information on the coffee canker caused by *Ceratostomella* [*Ceratocystis*] *fimbriata* in Colombia [*R.A.M.*, 32, p. 481 and next abstract].

Castaño (J. J.). **Control de la llaga macana del Cafeto.** [Control of 'sabre wound' of the Coffee bush.]—*Bol. inf. Colombia*, 4, 40, pp. 17–22, 1953. [Mimeoprinted.]

Full directions are given for the control of coffee canker (*Ceratostomella* [*Ceratocystis*] *fimbriata*) [see preceding abstract] by the excision or disinfection of the lesions. Completely girdled branches should be cut out and smaller cankers treated,

after removal of infected tissue, with 10 per cent. formalin, followed by the application of a protective coating of Bordeaux paste.

TARR (S. A. J.). **Seed treatment against blackarm disease of Cotton in the Anglo-Egyptian Sudan.**—*Emp. Cott. Gr. Rev.*, 30, 1, pp. 19–33, 1953.

The author summarizes research carried out from 1947 to 1952 at the Gezira Research Farm, Anglo-Egyptian Sudan, on the control of cotton blackarm (*Xanthomonas malvacearum*) by seed treatment with chemicals [*R.A.M.*, 32, pp. 118, 375]. Under the local conditions only mercurial dressings gave adequate protection. Thus, in three field trials abavit B gave 0·09, 1·32, and 1·12 per cent. infected seedlings, as against 11·8, 37·24, and 34·01 per cent., respectively, for untreated seed; of the non-mercurial compounds tested cuprous oxide was the most promising, the corresponding figures for perenox (50 per cent. copper as cuprous oxide) being 0·28, 3·39, and 2·99 per cent. Of sulpha-compounds tested in another trial, sulphathiazole was the best, but there were 9·47 per cent. infected seedlings, as against 0·23 per cent. for abavit B and 16·53 per cent. for the untreated. Chloramphenicol, streptomycin, and penicillin at different strengths allowed 8·33 to 23·83, 18·59 to 24·7, and 13·74 to 33·91 per cent. infected seedlings, as against 1·69 per cent. for abavit B and 43·7 per cent. for the untreated.

In two trials R 1489 (5 per cent. mercury) was significantly better than abavit B (5·67 mercury), both used at 1:150 w.w. Granosan M and phenyl mercury salicylate also showed promise. Shaking treated seed in sacks to simulate movement in transit caused a highly significant decrease in the efficiency of treatment (3·59 per cent. infection, as against 1·28), whereas light spraying of treated seed with water followed by drying was beneficial (1·05), and two hours' steeping more so (0·81). The addition of dyes to the dressing reduced its effectiveness.

The vapour from both abavit B and agrosan GN (5 per cent. mercury) was effective in reducing seed-borne infection. Seed for sowing should be treated as soon as possible after ginning in order that this effect may be in action for as long as possible.

Normal seed does not appear to be damaged by abavit powder of 30 per cent. mercury content, but for acid-delinted seed a weaker dressing should be employed. Other work demonstrated that while laboratory methods of estimating the toxicity of bactericides to *X. malvacearum* may provide useful preliminary information, they cannot replace field trials.

MILLER (J. H.). **Report of preliminary study of tri-basic copper in control of Ascochyta blight of Cotton.**—Abs. in *Phytopathology*, 43, 5, p. 292, 1953.

Ascochyta gossypii [*R.A.M.*, 32, pp. 119, 624] was found to be the principal agent, sometimes accompanied by thrips or *Rhizoctonia* [*Corticium*] *solani* [cf. 33, p. 27] or both, of a premature dying-off of cotton which is frequently observed in northern Georgia, especially in the absence of crop rotation, and causes heavy losses, sometimes necessitating replanting. The best control of the disease in dusting experiments on plots in a one-acre field with a continuous cotton record, the initial treatment being applied when the plants were fully emerged and thereafter at four-weekly intervals at the rate of 20 lb. per acre, was given by 7 per cent. tribasic copper [sulphate] plus 5 per cent. DDT, with a surviving population of 178 plants (compared with 115 in the untreated plots), followed by 7 per cent. tribasic plus 2 per cent. zinc sulphate (174), 5 per cent. tribasic plus 2 per cent. zinc sulphate plus 5 per cent. DDT (157), and 6 per cent. tribasic (155).

ARNDT (C. H.). **Survival of Colletotrichum gossypii on Cotton seeds in storage.**—*Phytopathology*, 43, 4, p. 220, 1953.

According to a personal communication from D. M. Simpson, when Carolinadel

and Deltapine cotton seed from lots naturally infected by *Colletotrichum* [*Glomerella*] *gossypii* and previously tested at the South Carolina Agricultural Experiment Station [*R.A.M.*, 25, p. 261] was germinated after 13·5 years of storage, there were no viable seeds among those maintained at the fluctuating temperature of the storage house or at 33° C. At 21° the only viable seeds were in two sublots with an 8 per cent. moisture content, whereas there were at least 70 per cent. among those held at 1° and having moisture contents of or under 14 per cent.

In experiments performed by the writer with the viable seeds, after 12 days in culture at 24° only Deltapine with an 8 per cent. moisture content stored at 1° revealed a high incidence (70 per cent.) of anthracnose. A small percentage of Carolinadel with a 10 and Deltapine with a 12 per cent. moisture content both stored at 1° also developed infection (12 and 5, respectively). *Rhizopus nigricans* [*R. stolonifer*] destroyed a few cotyledons in four sublots, while *Fusarium moniliforme* [*Gibberella fujikuroi*] was identified on some 10 per cent. of the seedlings infected by *Glomerella gossypii* and on several others.

Francke-Grosmann (Helene). **Über die Ambrosiazucht der beiden Kiefernborkenkäfer Myelophilus minor Htg. und Ips acuminatus Gyll.** [On the ambrosia culture of the two Pine bark beetles, *Myelophilus minor* Htg. and *Ips acuminatus* Gyll.]—*Medd. SkogsforsknInst., Stockh.*, 41, 6, pp. 1–52, 23 figs., 1952. [English summary.]

The conclusions of Rennerfelt and Mathiesen regarding the blue-stain fungal symbionts of the bark beetles *Myelophilus* (*Blastophagus*) *minor* and *Ips acuminatus* [*R.A.M.*, 31, p. 42] were largely corroborated by the author's studies on the same problem at the Forest Research Institute, Stockholm, in 1950. *Trichosporium tingens* is an ambrosia fungus which is constantly associated with *M. minor* and regularly found in its breeding places, while a similar relationship exists between *T. tingens* var. *macrosporum* n.var. and *I. acuminatus*. These are the two principal agents of blue stain in pine sapwood infested by the beetles, the effects of the occasional concomitants, *Ophiostoma canum* [*Ceratocystis cana*] and *O. clavatum*, being purely subsidiary and their ecological connexion with the insects doubtful. *Dipodascus aggregatus* n.sp., an associate of *Hylecoetus dermestoides*, was shown to be quite unrelated to *T. tingens*.

Arya (H. C.) & Prasada (R.). **Alternaria blight of Linseed.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 33–39, 2 figs., 1953.

A severe outbreak of *Alternaria* blight on linseed flax occurred at the Indian Agricultural Research Institute, New Delhi, in March and April, 1949. The disease has previously been attributed to *Alternaria lini* [*R.A.M.*, 13, p. 239], but the reports of various *A.* species associated with similar diseases in different parts of the world motivated further studies on the causal organism and allied species.

A comparison was made of the morphology of isolates from the New Delhi outbreak, *A. brassicae* from cabbage, *A. tenuis* from wheat seed, and *A. solani* from potato. The New Delhi isolates agreed closely with *A. brassicae* in morphology and cultural characters. Optimum growth occurred at 26° to 30° C. and pH 5 to 6·5 in a saturated atmosphere. They infected cabbage, cauliflower, kohlrabi, and *B. campestris* var. *sarson* as well as linseed. Of the other species only *A. brassicae* produced typical blight symptoms on linseed. The author concludes that *A. lini* is identical with *A. brassicae* and the latter is responsible for the blight disease.

Conidia were able to survive the summer in a room but not under field conditions. Preliminary tests indicated that agrosan GN 2·5 to 1,000 and phygon 1 to 1,000 eliminated artificial seed infection.

KATSURA (K.). **Notes on two new diseases of Chinese Jute (Abutilon avicennae Gaert.).**—*Forsch. PflKr., Kyoto*, 4, pp. 103–106, 2 figs., 1951. [Japanese, with English summary. Received 1952.]

Two new species of fungi on *Abutilon avicennae* are described. One, *Colletotrichum pehkinensis*, is the cause of an anthracnose, the irregular leaf spots, fuscous-brown on the upper surface and pale olive on the lower, being 3 to 10 mm. broad. The non-septate conidiophores are 9 to 18 by 2·1 to 3 μ, the lunate conidia 15 to 30 by 3 to 4·5 μ, and the uni- to triseptate setae 36 to 90 by 3 to 4·5 μ. It was found in three different localities in China in 1943. The other, *Tuberculariа abutilonis*, causes a stem rot. The brown, later ashen lesions, 2 to 8 cm. broad, bear pink, later black acervuli 210 to 444 μ (rarely 1 mm.) in diameter. The conidia are 5·7 to 8·4 (up to 18) by 2·4 to 3 μ. It was recorded from two localities in China in 1943 and 1944.

BRIERLEY (P.). **Some experimental hosts of the Chrysanthemum stunt virus.**—*Plant Dis. Reptr*, 37, 6, pp. 343–345, 1953. [Multilithed.]

In studies at Beltsville, Maryland, on the host range of chrysanthemum stunt virus [*R.A.M.*, 30, p. 231; 32, p. 561] 76 species and varieties, mostly Compositae, were tested by sap or graft inoculation, using the chrysanthemum varieties Mary MacArthur and Mistletoe as sources of the virus and as indicators. Of these, 39 were susceptible but only *Chrysanthemum coccineum*, *C. morifolium*, *C. prealtum*, *C. parthenium* and its form *flosculosum* (Matricaria Golden Ball), *Senecio cruentus*, and *S. glastifolius* developed recognizable symptoms. The others could serve as symptomless carriers of the disease if naturally infected. None of the *Chysanthemum* species tested was immune, but *C. parthenium* and also *Tanacetum vulgare* showed resistance. *C. cinerariifolium* and *C. majus* were susceptible; chicory, cardoon [*Cynara cardunculus*], lettuce, and salsify were not infected.

BALD (J. G.). **Control of disease by heat-curing and dipping Gladiolus corms. I. Wound periderm and the extension of lesions. II. Incidence of lesions. III. Dipping trials.**—*Phytopathology*, 43, 3, pp. 141–145; 146–150; 151–155, 3 figs., 1 graph, 1953.

At the Department of Plant Pathology, University of California, Los Angeles, the best of the treatments investigated for the development of periderm and a cuticle resistant to fungal infection, mostly by *Fusarium oxysporum* f. *gladioli* and *Botrytis gladiolorum* [*R.A.M.*, 33, p. 29 and above, p. 73], in gladiolus corms was curing at a temperature of 95° F. immediately after digging. The treatment was not effective if postponed until the old corms and roots were ready for stripping off, probably because the pathogens had been given time to penetrate the new corm tissues before periderm formation. A programme for heat-curing on commercial lines was worked out in co-operation with growers. The advance of *F. o.* f. *gladioli* through the tissues of stored corms was mainly intercellular and not necessarily reflected, therefore, in the presence of visible lesions. Infection was frequently carried on or in the dried husks. The lesions of *B. gladiolorum* seemed often to originate at buds and leaf scars. In some varieties, e.g., Lady Jane, they were relatively superficial, while in others, such as Helen Mayne, the vascular bundles and parenchymatous tissues were readily invaded and core decay was prevalent.

Isolated cases of dry rot (*Sclerotinia gladioli*) [32, p. 190] were observed in the course of these studies, but large-scale local development of the disease seems to be precluded by the predominantly unfavourable environmental conditions. *Rhizoctonia* [*Corticium*] *solani* [24, p. 315] was found regularly on certain stocks, causing shredding of mature corm husks and of the outer basal sheathing leaves: it did not, however, seriously impair plant growth.

Lysol (2 qt. per 100 gals.) and ferbam (2 lb.) were the fungicides chiefly used, singly or in combination, in immersion trials, the dipping period being 30 minutes. The effect of lysol on the expansion of lesions and on yield was greatly influenced by the state of the corms when dipped. Sometimes it decreased disease symptoms and increased yield but at others the tendency was the reverse. Suppression of secondary invaders or possibly antagonists of *F. o.* f. *gladioli* by the lysol may explain these opposite effects. Ferbam acted directly on the *Fusarium* but had little effect on the secondary or antagonistic invaders.

In two years' field trials new improved ceresan proved to be more effective than lysol plus ferbam in the control of *F. o.* f. *gladioli* and the neck rot phase of *B. gladiolorum*, but with *C. solani* the position was reversed. These results illustrate the general principle that different materials exert specific effects on the several pathogens attacking gladiolus corms. These differences are attributable to changes in the efficiency of the active ingredients of the dips through a number of variables, and the erratic behaviour of fungicides may be partially corrected by raising the natural defences of the corms, notably by proper curing, to a level ensuring protection against infection under a wide range of conditions. Injury to corms treated with new improved ceresan was reduced or entirely eliminated by curing at high temperatures permitting the development of periderm over exposed surfaces.

Berkeley (G. H.). **Some viruses affecting Gladiolus.**—*Phytopathology*, 43, 3, pp. 112–115, 5 figs., 1953.

This is an expanded account of work at the Laboratory of Plant Pathology, St. Catherines, Ontario, Canada, on bean yellow mosaic virus [*R.A.M.*, 33, pp. 7, 68, and below, p. 88], strains A, B, and C of tobacco ring spot virus, and cucumber mosaic virus all isolated from several varieties of gladiolus [30, p. 416].

Strain A produced on rubbed Harrow Velvet tobacco leaves minute, whitish rings and systemic chlorotic circles and patterns, while antirrhinum and Bountiful bean [*Phaseolus vulgaris*] reacted by severe necrosis. Tobacco inoculated with strain B developed acute necrosis and distortion, while necrosis was also a feature of infection on cucumber. Strain C was almost symptomless on tobacco and caused only superficial etching on antirrhinum and mild reactions on cowpea and bean. The thermal inactivation points of the three strains were 61°, 61°, and 57° C., respectively, of bean yellow mosaic virus 59°, and of cucumber mosaic virus 71°. Strain A and bean yellow mosaic each produced on one-year-old gladiolus seedlings mild chlorotic mottling, whereas whitish specking was the response to strain B, and strain C induced no symptoms though it was readily recovered from the inoculated material. In combination with bean yellow mosaic virus strain A induced a whitish specking similar to that caused by B alone. The gladiolus strain of cucumber mosaic virus was responsible for prominent and persistent mottling, accompanied by greyish streaks, on all the unfolding leaves.

No definite correlation was secured between the virus or viruses isolated and the syndromes on the gladiolus varieties from which they were isolated.

Silberschmidt (K.). **Studies on a mosaic of Nasturtium occurring in Brazil.**—*Phytopathology*, 43, 6, pp. 304–308, 1 fig., 1953.

The nasturtium (*Tropaeolum majus*), widely grown as an ornamental in São Paulo, Brazil, is subject to infection by a sap-transmissible mosaic virus responsible for mottling, veinbanding, and crinkling of the leaves, and in severe cases generalized stunting [cf. *R.A.M.*, 30, p. 40]. The virus moves freely upwards in its host but not downwards, and could not be detected in the roots of systemically infected plants. The natural spread of infection in flower-beds does not appear to occur through the root systems. Of the various other plants inoculated with the nasturtium virus,

only zinnia developed systemic symptoms; on the foliage of tobacco, *Nicotiana glutinosa*, and tomato infection was limited to a few grey, depressed spots. Inoculation experiments on nasturtium with tomato spotted wilt virus failed to induce the virulent symptoms described by Norris from Australia (*Bull. Coun. sci. industr. Res. Aust.* 202, 1946).

The thermal inactivation point of the Brazilian nasturtium virus was found to be 58° C. In a limited number of trials sap from diseased plants lost its activity on dilution with more than 100 parts (by volume) of water, and after 24 hours' ageing at room temperature. The existence of severe and mild strains of the virus was demonstrated by consistent divergences in the symptoms induced in inoculation experiments with sap from different plants. Systemic infection by a mild strain of the virus conferred partial or total resistance to superinoculation with an aggressive strain. The nasturtium mosaic under discussion is considered to be distinct from that caused by tomato spotted wilt virus and presents many analogies with that described by Jensen from California (*Phytopathology*, 40, p. 967, 1950).

The Rhododendron year book, 1951–52, number six.—194 pp., 75 pl. (4 col.), London, The Royal Horticultural Society, 1953. 15*s.* net.

The observations on the incidence, symptoms, and control of bud blast of rhododendron (*Pycnostysanus azaleae*) by A. F. H. Baillie and W. F. Jepson (pp. 72–78) have already been noticed from another source [*R.A.M.*, 31, p. 240].

Yoshii (H.). **On the two new species of Monochaetia on Azalea.**—*Forsch. PflKr., Kyoto*, 4, pp. 180–183, 4 figs., 1951. [Japanese, with English summary. Received 1952.]

Two new fungi on azalea (*Rhododendron*) were collected near Matsuyama, Japan. *Monochaetia rhododendri* n.sp., causing a leaf spot on *R. linearifolium* var. *macrosepalum*, forms acervuli 95 to 170 μ in diameter with 4-septate spores 14 to 23·4 by 4·5 to 7·2 μ, having appendages 1·8 to 10·8 μ long. *M. rhododendricola* n.sp., which induces a white leaf spot on *R. obtusum* var. *kaempferi*, has acervuli 90 to 150 μ in diameter with 3-septate spores 13·2 to 17·8 by 2 to 4·4 μ, having appendages 2·2 to 4·4 μ long. The fungi are compared with other species of the genus.

Baker (K. F.). **Chalaropsis root rot of Rose.**—*Plant Dis. Reptr*, 37, 8, pp. 430–433, 1953. [Multilithed.]

Rose 'black mould' (*Chalaropsis thielavioides*) [*R.A.M.*, 25, p. 452] occurred for the first time in southern California in 1952–3, causing severe root injury in a glasshouse and a nursery. Infection originated in a nursery field, the root rot being aggravated by prolonged storage of the plants in wet moss and by excessive watering after planting in the glasshouse. Affected plants made satisfactory recovery when grown under drier conditions. The fungus is believed to be unable to attack actively growing tissue, its pathogenicity having been overrated.

Thomas (H. E.) & Scott (C. E.). **Rosette of Rose.**—*Phytopathology*, 43, 4, pp. 218–219, 1 fig., 1953.

A virus disease designated rosette, affecting *Rosa rubrifolia* in Wyoming and a native rose, possibly *R. pisocarpa*, in California, is characterized on the former species by malformation of the leaflets and floral parts, dwarfing of stems, precocity of lateral buds, an indefinite chlorotic pattern on the leaves, and increased thorn production on the stems. Infection from the Wyoming material was transmitted by grafting to *R. multiflora*, *R. nutkana*, *R. odorata*, *R. rubrifolia*, and the rose varieties Belle of Portugal and Ragged Robin, the incubation period ranging from three to 14 months, while the California virus was successfully inoculated into *R. odorata* and *R. nutkana*; the symptoms, however, took 19 months to develop.

So far, rosette is only a potential threat to the rose-growing industry in California. From experience in Wyoming its eradication appears to be practicable but not easy. A few affected plants were still to be found four years later near the original site of infection.

Brady (Beryl). **Some observations on the sporidial stage of the life cycle in Entyloma species.**—*Rev. Path. vég.*, 32, 1, pp. 32–36, 1 fig., 1953.

A comparative study of the sporidial stage of species of *Entyloma* collected in England and France demonstrated that the chlamydospores formed by *E. dahliae* in dahlia, *E. calendulae* in *Calendula officinalis*, and *E. eryngii* in *Eryngium campestre* (all from France) germinate *in situ*, thus contributing to the crop of sporidia on the leaf surface. In *E. ficariae* on *Ranunculus ficariae*, *E. tanaceti* on *Tanacetum vulgare*, *E. serotinum* on *Symphytum officinalis*, and *E. fergussoni* on *Myosotis arvensis* and *M. stricta* (all from France) the chlamydospores do not germinate immediately, but a surface coating of sporidia similar to that in the first three is formed independently. In all species the sporidia are of the typical allantoid or crescent-shaped type, are uninucleate, and discharged by the water-drop mechanism. Five species produced, in addition, a larger, binucleate, 'halfmoon-shaped' sporidium [*R.A.M.*, 14, p. 655], also discharged by a water-drop mechanism from the parasitic mycelium at both surfaces of the leaf.

Both kinds germinate on the surface of nutrient agar, forming a mycelium that can be maintained in culture for considerable periods [cf. 32, p. 639]. The uninucleate sporidia of all species give a narrow, non-septate mycelium tending to break up into short segments; the binucleate give a stouter, more rapidly growing mycelium, forming clamp-connexions at regular intervals. After three weeks in culture the mycelia of *E. calendulae*, *E. dahliae*, *E. tanaceti*, and *E. serotinum* formed spherical spores resembling the chlamydospores on the host.

When the 'halfmoon-shaped' sporidia germinate on a hard surface they emit a short germ-tube which swells out at the tip into a richly lobed, appressorium-like structure. When, however, spores are germinated on a slide thinly smeared with albumin, one or more hyphae frequently grow out of the appressorium and spread along the slide, forming clamp-connexions similar to those in agar culture.

Skalický (V.). **Nebezpečný houbový parasit Tařice—Peronospora galligena Blumer — v Československu.** [A dangerous fungus parasite of Sweet Alyssum—*Peronospora galligena* Blumer—in Czechoslovakia.]—*Čes. Mykol.*, 7, 3, pp. 133–136, 3 figs., 1 graph, 1953. [Russian and English summaries.]

Peronospora galligena was observed for the first time in Czechoslovakia on the leaves, stems, inflorescences, and flowers of *Alyssum saxatile* ssp. *arduini* and garden varieties of *A. saxatile* [*R.A.M.*, 18, p. 683].

Mariat (F.). **Sur une pourriture bactérienne des Cattleya.** [On a bacterial rot of *Cattleya* plants.]—*Rev. Path. vég.*, 32, 1, pp. 14–18, 4 figs., 1953.

Cattleya spp. growing in a hothouse in the vicinity of Paris recently developed a wet rot. Infected material contained a bacterium provisionally identified as *Erwinia carotovora* [*R.A.M.*, 31, p. 186], inoculations with which into healthy *Cattleya* plants reproduced the condition, the organism being reisolated.

Park (J. Y.) & Sprague (R.). **Studies on Selenophoma species on Gramineae.**—*Mycologia*, 45, 2, pp. 260–275, 1 pl., 1 fig., 1953.

Comparative studies on species of *Selenophoma* [cf. *R.A.M.*, 28, p. 329; 31, p. 353] carried out at Washington State College and the Tree Fruit Experiment Station, Wenatchee, Washington, demonstrated that the spores of most species of the genus have an optimum temperature for germination of 15° to 25° C. and a

minimum of 6°, though *S. bromigena* [29, p. 407] on *Bromus inermis* germinated at 1°. Of the species studied, *S. everhartii* [24, p. 512] was best adapted to high temperatures; its optimum for spore germination was 25°, and the spores required 40 hours' incubation to reach maximum germination.

Most species and varieties produced secondary conidia as well as hyphae at 15° to 20°, but *S. bromigena* from *B. carinatus* and *S. everhartii* from *Festuca myuros* and *Calamagrostis rubescens* produced only hyphae at temperatures of 25° or more. The spores of *S. bromigena* from *B. carinatus* formed septations before germinating. On the whole, all species and varieties germinated most rapidly at 100 per cent. relative humidity, but germination occurred even at 81 per cent. Most of them had a pH optimum of 5 to 6, though for *S. bromigena* the figure was 4·5 to 5.

S. obtusa [loc. cit.] on *Agropyron spicatum* grew more rapidly and vigorously than any other isolate studied, colony diameter increasing at double the rate of *S. everhartii*, the slowest-growing species on Gramineae.

Pycnidia of *S. bromigena* formed on *B. inermis* and *B. carinatus* two weeks to 20 days after inoculation. The optimum temperature range for host infection (using 43 species of Gramineae in 15 genera) by spore suspensions was 65° to 70° F., with an incubation period of 72 hours. The host plant was most susceptible when 20 to 30 days old and three to four inches high. Most of the isolates were restricted to their original hosts or closely related ones. One exception was *S. donacis* [31, p. 331] from wheat, which attacked *Poa pratensis*. Three races could be distinguished, race 1 on wheat, 2 on *P. ampla*, and 3 on *Elymus*. *S. bromigena* attacked only *Bromus* spp.; there were three races: 1, on *B. inermis*; 2, weakly pathogenic, on *B. carinatus*; and 3, also weak, on *B. ciliatus*.

Nattrass (R. M.). **A disease of Lucerne in Kenya.**—*E. Afr. agric. J.*, 18, 3, pp. 97–98, 4 figs., 1953.

In 1951 lucerne plants growing in Kenya were killed by *Rosellinia necatrix* [*R.A.M.*, 30, p. 309]. By 1952 the dead patches had spread each over an area of several square yards and were scattered about within a few yards of each other over a wide belt. Portions of affected roots kept in a moist atmosphere developed the *Graphium* state. In February, 1953, the fungus was also found on lucerne 100 miles away.

Houston (B. R.) & Oswald (J. W.). **The mosaic virus disease complex of Ladino Clover.**—*Phytopathology*, 43, 5, pp. 271–276, 2 figs., 1953.

At least four virus strains have been isolated by sap inoculation to Bountiful bean (*Phaseolus vulgaris*) from Ladino white clover plants showing a number of different mosaic symptoms in the field in California [*R.A.M.*, 30, p. 284]. Of 11 plant samples selected from various fields on the basis of symptom expression, eight harboured more than one virus strain. One virus produced only local lesions on every bean variety tested, and another on all except Bountiful but was further responsible for systemic necrosis and mottle in all. Ladino clover reacted divergently to these two strains, but they were mutually indistinguishable on lucerne, broad bean, celery, potato, and tobacco. The thermal inactivation points of the two strains were slightly different but they conferred reciprocal cross-protection, which was also obtained between these isolates and strains from lucerne with typical mosaic symptoms. From their properties these two isolates are classified as composite strains of lucerne mosaic virus. They were also isolated from five naturally infected lucerne plants showing mosaic symptoms, all of which carried the local lesion strain as manifested on Bountiful bean and one the systemic strain also. Four potato samples with either calico or tuber necrosis [33, p. 46] carried the local lesion strain and two of them the systemic strain as well.

Two other virus strains isolated from Ladino clover attacked leguminous hosts only, one causing severe necrosis and yellow mottle on bean and the other merely a mild yellow mottle. Ladino clover infected by these strains was somewhat stunted, with small, chlorotic spots between the veins of the slightly rugose leaves. The two isolates agreed with bean yellow mosaic virus [33, p. 663 and above, p. 84] and are consequently regarded as strains of that virus.

The Fruit year book, 1951–52, number five.—vii+152 pp., 42 pl. (1 col.), 2 figs., London, The Royal Horticultural Society, 1953. 15*s.* net.

In a list of fruit varieties developed at the New York State Agricultural Experiment Station, Geneva (pp. 10–18) by R. Wellington, G. H. Howe, and G. L. Slate, are mentioned a new early black grape variety Kendana, resistant to mildew [*Uncinula necator*: *R.A.M.*, 29, p. 499; 30, p. 402], and the raspberry variety Milton (Lloyd George × Newburgh), which is free from mosaic [31, p. 615].

A specification for a stirrup pump spray outfit with lance and hose equipment is given by H. G. H. Kearns and N. G. Morgan (pp. 94–97) [cf. 31, pp. 194, 286]. It is simple in design, reliable, easily maintained, and is capable of applying 20 gals. per hour under garden conditions.

Bradfield (A. E.) & Flood (A. E.). **Chlorosis in Apple leaves.**—*Rep. E. Malling Res. Sta., 1952*, pp. 109–111, 1 graph, 1953.

At East Malling Research Station a linear relationship was found to exist between the chlorophyll and carotene contents of apple leaves of Malling VII stocks, whether healthy or exhibiting chlorosis arising from iron deficiency [*R.A.M.*, 27, p. 74], potassium deficiency [30, p. 170], or severe mosaic virus [see next abstract].

Posnette (A. F.) & Cropley (R.). **A preliminary report on strains of the Apple mosaic virus.**—*Rep. E. Malling Res. Sta., 1951*, pp. 128–130, 2 pl., 1952.

Hitherto apple mosaic has been considered of little economic importance, but the discovery of it causing severe defoliation of Bramley's Seedling in a Kent orchard in 1948 led to an investigation of possible strains of the virus [see above, p. 69] at East Malling from 1948 to 1950. Transmission experiments, using Cox's Orange Pippin, Hormead Pearmain, and Lord Lambourne as indicators, yielded three strains, namely severe mosaic [see preceding abstract], vein-banding (= 'Lambourne vein-banding' and 'slight Bramley'), and mild mosaic (= 'Lambourne flecking').

In cross-protection tests three Lambourne trees with mild mosaic symptoms were inoculated with the vein-banding strain and three with severe mosaic, two symptomless Lord Lambournes being inoculated with each as controls. The mild strain prevented the multiplication of the vein-banding strain, suggesting that they may be closely related strains of the same virus.

The symptoms of apple mosaic fall into the following categories: (*a*) white or pale yellow flecks often on a veinlet but frequently bearing no regular relationship to the veins; (*b*) large white or pale yellow patches extending over two or more of the areas between the main veins; (*c*) vein-banding; and (*d*) necrotic areas which usually develop on the chlorotic patches of type (*b*).

The severe strain causes pronounced symptoms of all categories on Bramley's Seedling. The chlorotic areas are bright yellow in early summer, gradually fading to white. Vein-banding is well-developed, particularly on the young leaves on the extension growth, mosaic symptoms occurring almost up to the tips. Large necrotic areas develop on the older leaves and considerable defoliation occurs.

The vein-banding strain in Bramley's Seedling, Cox's Orange Pippin, Hormead Pearmain, and Lord Lambourne induces symptoms of all categories, but banding

is the most conspicuous. Small flecks may occur on or between the veins. In comparative transmission tests the symptoms on Bramley's Seedling, M VII, and M IX rootstocks were paler yellow and more confined to old leaves on the extension growth than were those of the severe strain.

The inconspicuous, sparse flecking on only a few leaves characteristic of the mild mosaic strain is often overlooked.

Posnette (A. F.). **Virus transmissions between Prunus and Malus species.**—*Rep. E. Malling Res. Sta., 1952*, p. 131, 2 pl., 1953.

Concentric ring spot virus from plum, transmitted by grafting to apple seedlings, caused vein-clearing in autumn followed by yellow ring and line patterns in spring, symptoms distinct from those of apple mosaic [see preceding abstract]. Another virus, probably that causing rubbery wood [see next abstract], transmitted by grafting from apple stocks to peach seedlings, produced purple rings and lines on the leaves, indicating that peach may be a useful indicator for this virus.

Posnette (A. F.) & Cropley (R.). **The rubbery wood virus and Apple propagation.** —*Rep. E. Malling Res. Sta., 1951*, pp. 131–132, 1 pl., 1952.

In autumn, 1949, 12 stools were selected at random in each of the East Malling apple stool beds M I, M II, M IV, M VII, M IX, M XVI and two in M III, five layers being planted out from each stool. In July, 1950, each layer was budded from Lord Lambourne trees unaffected by the rubbery wood virus [*R.A.M.*, 31, p. 558 and preceding abstract] so that five maiden trees from five different scion sources were obtained from each stool. Fifty 'free' seedlings of Cox's Orange Pippin and Worcester Pearmain were budded with the same Lord Lambourne scions as controls, together with five rootstocks of M XIII, five of Crab C, 18 of M III, and 24 of M VIII, the last two bought from a nurseryman.

In autumn, 1951, all the controls and all the maidens except those on M I, M IX, and the bought in M III and M VIII were normal, indicating that the five scion sources were free from the virus. Of the trees on M I, 15 were definitely rubbery, the stocks of which came from six of the 12 stools tested; 39 M IX trees were affected, involving ten stools. All 18 of the trees worked on M III were rubbery and 23 of the 24 on M VIII. Maidens grown from autumn budding and those from spring grafts were equally rubbery.

Posnette (A. F.). **Virus diseases and the propagation of fruit trees.**—*Rep. E. Malling Res. Sta., 1952*, pp. 179–181, 2 pl., 1953.

The author emphasizes the potential threat to fruit production and quality represented by the numerous virus diseases present or latent in orchards and fruit tree nurseries in Britain [see preceding abstracts] and the need for guarding against rootstock infection by using certified stocks, roguing diseased stocks and stools and those which did not take bud grafts, and the careful selection of mother trees. Wherever possible a pedigree system should be adopted. During the next few years East Malling Research Station intends to release virus-tested material for propagating some of the more important commercial varieties.

Crowdy (S. H.). **Observations on the effect of growth-stimulating compounds on the healing of wounds on Apple trees.**—*Ann. appl. Biol.*, 40, 1, pp. 197–207, 1 fig., 1 graph, 1953.

This report is an expanded account of work at Long Ashton Research Station already noticed from another source [*R.A.M.*, 29, p. 32]. The results are given to the end of 1949. In that year the rate of healing of all wounds examined was about the same.

Kotlaba (F.). **Nebezpečný parasit Jabloní—Sarcodontia crocea (Schweinitz) c.n.** [A dangerous parasite of Apple—*Sarcodontia crocea* (Schweinitz) n.comb.]—*Čes. Mykol.*, 7, 3, pp. 117–123, 3 figs., 1953. [Russian and English summaries.]

The author gives a description of the fungus for which he proposes the new combination *Sarcodontia crocea* (syn. *Sistotrema croceum*, *Hydnum croceum*, *H. setosum*). It causes serious losses in all the apple-growing regions of Czechoslovakia.

Byrde (R. J. W.), Crowdy (S. H.), & Roach (F. A.). **The role of eradicant sprays in the control of Apple canker.**—*Rep. agric. hort. Res. Sta. Bristol, 1951*, pp. 134–137, 1951.

This information on the control of *Nectria galligena* on apple at Long Ashton Research Station has already been noticed from another source [*R.A.M.*, 32, p. 567].

Taylor (J.). **The effect of continual use of certain fungicides on Physalospora obtusa.**—*Phytopathology*, 43, 5, pp. 268–270, 1 fig., 1953.

To verify the hypothesis that the protracted use of fungicides in northern Georgia apple orchards has resulted in the development of fungicide-resistant strains of the black rot fungus, *Physalospora obtusa* [*R.A.M.*, 32, pp. 260, 631], several compounds were tested in 1952 at the Mountain Experiment Station, Blairsville, against conidia from eight counties of the State, using a slightly modified form of the slide-germination method [22, p. 489]. In two of the tests a significant interaction occurred between treatment and source of inoculum, especially in the case of 2–4–100 Bordeaux mixture, which tended to be more toxic to conidia from unsprayed orchards than to those from localities where the fungicide had been applied for lengthy periods (eight years and upwards).

Manganese ethylene bisdithiocarbamate [cf. 32, p. 568] at 1·8 gm. per l. and Bordeaux mixture 8–8–100 almost completely inhibited conidial germination, while ferbam and ziram (both at 1·8 gm. per l.) suppressed it by more than 50 per cent., the growth of the germ-tubes being arrested at a length of 80 to 100 μ. Wettable sulphur and lime-sulphur did not significantly reduce germination. Bordeaux mixture 2–4–100 and ferbam were more effective against conidia collected in March than against January and February gatherings.

Byrde (R. J. W.). **The effect of age of wound and of weather on the susceptibility of Apple injuries to infection by the brown rot fungus.**—*Rep. agric. hort. Res. Sta. Bristol, 1951*, pp. 128–131, 1 graph, 1951.

Preliminary experiments conducted at Long Ashton Research Station on the effect of the age of wounds on apple fruits on their susceptibility to brown rot (*Sclerotinia fructigena*) [*R.A.M.*, 32, p. 569 and next abstract] indicated that infection takes place less readily on day-old than on freshly made injuries. Susceptibility of Laxton's Superb apples in the field is much higher in early September (mean temperature 61·6° F.) than later in the month (55·7°).

Byrde (R. J. W.) & Fielding (A. H.). **Tests of eradicant fungicides against brown rot. I.**—*Rep. agric. hort. Res. Sta. Bristol, 1951*, pp. 131–133, 1951.

In studies at Long Ashton Research Station on the inhibition of sporulation of detached, mummified apples infected with *Sclerotinia fructigena* [see preceding abstract], the diphenyl mercuric salt of dinaphthyl methane disulphonic acid was equal in eradicant efficiency to phenyl mercury chloride [*R.A.M.*, 32, p. 569]. There was no significant difference in eradicant efficiency between pentachlorophenol and its sodium salt, the effective concentrations of both these materials (0·8 and 0·4 per cent., giving 98 per cent. inhibition) being more economical than the mercurials.

Marsh (R. W.). **The spread of Armillaria mellea in Apple orchards.**—*Rep. agric. hort. Res. Sta. Bristol, 1951*, pp. 116–121, 2 diags., 1951.

This paper is a slightly abridged version of work at Long Ashton Research Station already noticed from another source [*R.A.M.*, 32, p. 320].

Padfield (C. A. S.). **Effect of delay between harvesting and cool-storing on Sturmer Pippin Apples.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 2, pp. 152–158, 1953.

Studies at the Fruit Research Station, Havelock North, New Zealand, in 1951 and 1952 showed that delay intervals of 10 and 20 days between harvesting and cool-storing Sturmer Pippin apples increased losses from the storage disorders internal breakdown [*R.A.M.*, 23, pp. 4, 473], wilt [27, p. 115], superficial scald [28, p. 177], and ripe spot (*Neofabraea malicorticis*) [32, p. 83], and decreased hardness. (A preliminary account of this work appeared in *Orchard. N.Z.*, 25, 1, p. 19, 1952.)

Smith (L. C.). **Okanagan Turbo-Mist sprayer. Final report of 1952–53 trials.**—*J. Dep. Agric. S. Aust.*, 57, 2, pp. 73–75, 2 figs., 1953.

In 1952–3 the Okanagan 'Turbo-mist' sprayer, imported from Canada (*J. Dep. Agric. S. Aust.*, 56, 9, p. 415, 1953), was compared with the hand spray method on Rome Beauty apples in control trials against scab [*Venturia inaequalis*: *R.A.M.*, 33, p. 32]. Applications of 6–4–40 Bordeaux mixture by the hand method and 24–16–40 by the Turbo-mist were given at the green-tip stage; 1 in 25 to 1 in 40 and 1 in 10 lime-sulphur, respectively, at the pink; and 1 in 40 to 1 in 60 and 1 in 12 to 1 in 15 lime-sulphur, respectively, at petal fall. There was no significant difference in the amount of scab between hand sprayed and Turbo-mist sprayed trees at Kersbrook. At Lenswood the former had significantly less scab, 4·75 per cent. compared with 6·4 per cent., and also at Verdun (56·2 and 67·7 per cent.). The advantage of the Turbo-mist lies in its labour-saving capacity, one man being able to spray 10 to 15 acres per day and completing in two days work which with the hand spray would take 10 man days at 2 to 2½ acres per day.

Moore (M. H.). **An intensive field method for testing fungicides for Apple trees.**—*Rep. E. Malling Res. Sta., 1951*, pp. 139–147, 2 pl., 1952.

The author describes in detail his method [*R.A.M.*, 27, p. 243] of using apple stocks for testing fungicides against *Venturia inaequalis* [32, p. 631, and preceding and next abstracts] and the experimental developments which have been made since the method was first devised. Rootstock M III was chosen as the susceptible host, reasons for which are enumerated; pruning in sequence yielded a supply of young shoots for testing in May, June, and July; hop-lewing was erected around the stocks to prevent the dispersal of the moist air. Dew provided alternate wetting and drying favourable for infection.

This method induced severe natural scab infection of the foliage on one-year-old shoots in May, current-year shoots in June, and secondary shoots in July when the natural source of ascospore inoculum was exhausted. It is not infallible, however, for even with the modifications described it depends largely on the natural environment, but it provides a useful addition to a scheme of investigation ranging from precision laboratory tests to quasi-commercial tests on established plantation trees.

Moore (M. H.) & Kirby (A. H. M.). **Can the new organic fungicides help the fruit-grower?**—*Rep. E. Malling Res. Sta., 1951*, pp. 200–204, 1952.

The authors review the results obtained with the chief organic fungicides tested at East Malling since 1935 against apple scab [*Venturia inaequalis*: see preceding and next abstracts] and mildew [*Podosphaera leucotricha*: *R.A.M.*, 21, p. 213; 32, p.

260] and compare them with standard lime-sulphur and elemental sulphur sprays for efficiency, safety, and sulphur consumption.

KIRBY (A. H. M.). **Plant protective chemistry.**—*Rep. E. Malling Res. Sta., 1951*, pp. 46–48, 1952; *1952*, pp. 42–44, 1953.

The antibiotic antimycin A at the rate of 1 μgm per ml. caused 35 per cent. inhibition of germination of *Venturia inaequalis* [see above, p. 69] strain E1 in slide tests at East Malling Research Station in 1951. In field trials [*R.A.M.*, 31, p. 477 and preceding and next abstracts] TP 13 gave particularly good control of *V. inaequalis* on Cox's Orange Pippin on M IX when applied as a post-blossom spray after pre-blossom lime-sulphur. Of two nitrosopyrazoles [31, p. 341], compared on Newton Wonder and Bramley's Seedling at 0·05 per cent., J49 again gave good results and was superior to J55, which differs only in the lack of the chlorine atom. Zineb (0·2 per cent.) and dinitrocaprylphenyl crotonate (0·05) were equal to 1 per cent. lime-sulphur; 0·2 per cent. manganese dimethyldithiocarbamate (manam) showed considerable promise.

Of several groups of compounds tested in 1952 for activity against *V. inaequalis* in slide germination tests zinc ethyl xanthate appeared considerably more toxic than the sodium salt, a similar differentiation being found between *o*- and *p*-hydroxydiphenyls. No significant activity was shown by several organo-sulphur compounds, including S-benzthiazyl N-cyclohexyl sulphenamide which is related to SR-406 [captan: cf. 31, p. 341].

BYRDE (R. J. W.) & MARSH (R. W.). **Spraying experiments against Apple and Pear scab at Long Ashton, 1951.**—*Rep. agric. hort. Res. Sta. Bristol, 1951*, pp. 122–128, 1951.

During the 1951 trials for the control of apple and pear scab [*Venturia inaequalis* and *V. pirina*: *R.A.M.*, 31, p. 189 and preceding abstracts] at Long Ashton Research Station the mean percentages of infected Worcester Pearmain apple leaves ranged from 0·04 to 0·2 and fruit from 0·02 to 0·07 for three applications of ziram, thiram (both at 0·3 per cent.), or lime-sulphur (2 and 1 per cent.), and from 0·58 to 0·64 and 0·26 to 0·3, respectively, for three proprietary organo-mercury sprays (all at 0·002 per cent. mercury), compared with 1·64 and 0·78, respectively, for the untreated. In another experiment on Worcesters captan (0·2 per cent.) gave 0·11 leaf and 0·07 per cent. fruit infection compared with 0·38 and 0·34 per cent. for lime-sulphur and 0·95 and 0·8 per cent. for the untreated. It was not phytotoxic to Worcesters, Lane's Prince Albert, or Stirling Castle and gave good control of pear scab (0·36 per cent. fruit infection as against 4·53 for controls). A 34 per cent. preparation of 341.SC. (at 0·375 per cent.) was more effective (equalling lime-sulphur) on apples than on pears (William's Bon Chrétien), giving 0·45 per cent. scabbed apples (control 1·01 per cent.) and 1·33 per cent. scabbed pears (4·53).

KIRBY (A. H. M.) & BENNETT (MARGERY). **Spray damage investigations in 1949–51.**—*Rep. E. Malling Res. Sta., 1951*, pp. 183–186, 1 chart, 1952.

Experiments to determine the toxicity of various chemicals to apple leaves and fruit were conducted at East Malling [*R.A.M.*, 31, p. 341] from 1949 to 1951 with trees about 15-years-old of Cox's Orange Pippin on M XII in each year, Worcester Pearmain on M IX in 1949 and 1950, and Cox's Orange and Beauty of Bath, both on M IX, in 1949 only. Several pear varieties were also tested. Detailed results are given in tabular form.

Fungicides based on 2-alkylglyoxalidines or on captan were quite safe on both apples and pears in all trials. Three copper cuprosulphite samples caused leaf fall

on apples when used at 0·2 per cent. copper content, but only leaf spotting at 0·15 per cent. or less. One sample at 0·1 per cent. was safe on pears in a year when Bordeaux mixture was also safe, but another caused scorch and leaf fall in a year when Bordeaux was damaging. A 25 per cent. wettable powder based on 2,4-dinitro-6-caprylphenyl crotonate was safe on pears in one season. A commercial formulation of bis- (*p*-chlorphenyl) methyl carbinol and laboratory formulations of azoxybenzene and alkyl, C_{12}–C_{13}, thiocyanates damaged apples but no damage was observed following applications of aldrin, dieldrin, toxaphene, 2-nitro-1,1-bis-(*p*-chlorphenyl) -propane or -butane, or both, diethyl-7(4-methylcoumarinyl) thionphosphate, ethyl-*p*-nitrophenyl phenylthionphosphate, or *p*-chlorphenyl *p*-chlorbenzenesulphonate. Apples were damaged in one year by lime-sulphur sprays with either lead or aluminium arsenate or zinc fluoroarsenate, but not in either of the other two years. A factor or factors other than the presence of soluble arsenic appeared to be involved. No damage followed applications of alkylglyoxalidines plus commercial BHC wettable powder in either of two years. Phenyl mercury chloride [see next abstract] plus either commercial BHC wettable powder or laboratory-formulated toxaphene was innocuous to apples in one season.

In one season no damage was observed on two gooseberry varieties sprayed with HETP at half, once, or twice the recommended strength or on plums sprayed with two laboratory formulations of toxaphene.

Kirby (A. H. M.) & Bennett (Margery). **An effect of phenyl mercury chloride on Pear leaves.**—*Rep. E. Malling Res. Sta., 1951*, pp. 187–188, 1 pl., 1952.

The leaves of ten pear varieties developed pale spots on the upper surface with brown or white spots beneath in 1951 though not in 1950, following post-blossom sprays with the combined fungicide-insecticide mercurated lead arsenate. In 1951 similar damage was incurred to Conference leaves following one application of phenyl mercury chloride [*R.A.M.*, 28, p. 68 and preceding abstract] precipitated on china clay or on lead arsenate. The former (at 0·01 per cent.) reduced the chlorophyll content by over 30 per cent. but leaf fall did not result.

Stanton (W. R.). **Breeding Pears for resistance to the Pear scab fungus Venturia pirina Aderh. I. Variation in the pathogenicity of Venturia pirina. II. The study of field resistance on selected Pear seedlings and the inheritance of resistance in seedling Pear families under controlled conditions.**—*Ann. appl. Biol.*, 40, 1, pp. 184–191, 192–196, 3 diags., 1953.

In work at the John Innes Horticultural Institution, Bayfordbury, Herts., three clones of *Venturia pirina* [*R.A.M.*, 33, p. 34] were tested for their pathogenicity [30, p. 476] to 40 varieties of cultivated pear grafted on potted seedlings, 12 of the varieties then being selected for differentiating the pathogenicity of 16 clones of the fungus. The clones showed major differences in pathogenicity, which separated them into four groups, and minor variations within each group. Clones isolated from Conference displayed wide differences in range of pathogenicity. No variety was immune from attack by all the isolates, though Beurré Giffard was resistant to all isolates tested except one from the Durondeau variety, to which it was slightly susceptible. Winter Nelis and Fertility (both field-susceptible) appeared to possess similar susceptibility to clones from William's Bon Chrétien, Durondeau, and eight of the 11 Conference clones. William's, Belle Julie, Glou Morceau (all field-susceptible), Doyenné du Comice and Fondante de Thirriott (both moderately resistant), Beurré Mortillet (very resistant), and Durondeau (moderately resistant) were not generally attacked by Conference clones. The group comprising the three last-named hosts differed from that comprising the previous four in that it was not attacked by the William's and Glou Morceau strains. Conference, Dr. Jules Guyot,

and Beurré Giffard were severely attacked only by the Durondeau and Conference clones. In this last group there appeared to be an increasing resistance in the order named. In contrast to the demonstrably limited range of certain biotypes is the field observation that almost all pear varieties are susceptible to scab, and to reconcile these two observations it is necessary to postulate a large number of biotypes.

Clonal isolates of *V. pirina* differing in range of pathogenicity were used to inoculate (1) resistant pear seedlings from families which appeared to be segregating for resistance under field conditions, and (2) two entire families of field-resistant (Conference or Beurré Giffard) × field-susceptible (Fertility or Doyenné du Comice) parentage. In (1) the fungus infected some seedlings hitherto regarded as field-resistant; in (2) segregation for susceptibility in both families varied with the clone of the fungus from approximately a 1:1 ratio to 'all resistant'. Resistance to individual clones appeared to be dominant to susceptibility. There was a general correlation between the different degrees of susceptibility to the different clones. Those that were most infective were isolated from the parental varieties. This correlation was not, however, complete, and clones of different host origin tended to attack different groups of seedlings.

Allan (H. R.). **Black spot of Josephine Pears.**—*J. Dep. Agric. S. Aust.*, 57, 2, p. 72, 1 fig., 1953.

In trials held in 1951 and 1952 in South Australia against pear scab [*Venturia pirina*: *R.A.M.*, 33, p. 32] 0·2 per cent. thiram did not cause russeting of the spray-sensitive variety Josephine and gave satisfactory control under the conditions of the trial.

Yoshii (H.). **On the histochemical observations on the inorganic substances of leaves infested with Pear-Juniperus rust and Peach leaf curl.**—*Forsch. PflKr., Kyoto*, 4, pp. 91–92, 1951. [Japanese, with English summary. Received 1952.]

Comparative microchemical analyses [at Kyushu University, Japan] of healthy and diseased tissues of pear leaves infected with the pear-*Juniperus* rust (*Gymnosporangium haraeanum*) [*R.A.M.*, 22, p. 172] and peach with leaf curl [*Taphrina deformans*: 7, p. 672; C.M.I. map No. 192] showed that the amount of nitrate and phosphate in the hypertrophied parts was not increased, whereas the potassium was. In infected pear leaves the amount of ammonium was increased, while there was no appreciable difference in peach.

Ark (P. A.). **Use of streptomycin dust to control fire blight.**—*Plant Dis. Reptr*, 37, 7, pp. 404–406, 1953. [Multilithed.]

An epiphytotic of pear fireblight (*Erwinia amylovora*) [*R.A.M.*, 32, p. 83] occurred in California during the spring of 1953. In a control trial on Bartlett trees bentonite dust containing 240 p.p.m. streptomycin base [cf. 31, p. 480; 32, p. 568] gave 83·8 per cent. control without fruit russeting when applied four times during March and April. If the results of further tests are consistent streptomycin may be a desirable substitute for copper dust, which caused light to severe russeting in this trial.

Carpenter (T. R.) & Shay (J. R.). **The differentiation of fire-blight resistant seedlings within progenies of interspecific crosses of Pear.**—*Phytopathology*, 43, 3, pp. 156–162, 2 figs., 1953.

At the Purdue University Agricultural Experiment Station, Lafayette, Indiana, the technique used for the differentiation of resistance and susceptibility to *Venturia inaequalis* among apple seedlings, involving their inoculation in the greenhouse a few weeks after emergence [*R.A.M.*, 28, p. 337; cf. 32, p. 489], was applied

to seedlings from controlled and uncontrolled crosses of *Pyrus ussuriensis* and *P. serotina* in connexion with the breeding of pears for resistance to fireblight (*Erwinia amylovora*) [5, p. 107; 13, p. 451; 14, p. 110, *et passim*].

No appreciable measure of resistance was expressed before eight leaves had been formed, but immune seedlings could be detected between the 8- and 18-leaf stages, and individuals with an intermediate type of reaction at the 18- to 24-leaf stage. The general resistance level of all populations increased with age. A higher percentage of susceptible plants was eliminated in the early stages of growth in the greenhouse than from similar progenies inoculated for the first time during the second year in the nursery. Thus, at three years of age (in 1950) the number of hold-over cankers was much larger on trees inoculated for the first time in the nursery than on those artificially infected in the greenhouse in 1948 and from which most of the susceptible types had been eliminated. The pathogen should be introduced into succulent tissue to ensure optimum infection, since the woody mature stem tips of susceptible seedlings tend to acquire resistance.

Posnette (A. F.). **Virus diseases of Plums.**—*Rep. E. Malling Res. Sta., 1952*, pp. 182–183, 2 pl., 1953.

In order that the use of infected material for propagation purposes may be avoided some virus diseases which may attack plums in Great Britain are described. Several viruses cause yellow lines on the leaves either as vein-banding [*R.A.M.*, 31, p. 558] or as wavy oak leaf patterns, sometimes accompanied by stunting or a reduction in vigour. Yellow ring spot, becoming shot hole, causes some loss of vigour in the rootstock clones Brompton, Common Plum, and Marianna. The spots resemble those of *Pseudomonas mors-prunorum* but are larger. Mosaic [32, p. 234; 33, p. 36] has been observed as several forms of chlorotic marking. Upward leaf rolling [31, p. 558] may be caused by the same virus as that causing peach yellows [30, p. 329; 32, p. 224]. The leaves stiffen and rattle and there is some loss of vigour. Veinlet clearing and severe stunting occurred on Myrobalan seedlings grafted in 1952 with the gage varieties Denniston's Superb and Kirke's Blue. Prune [plum] dwarf virus [31, p. 50] produced narrow, strap-like leaves on Switzen Prune in Kent. Severe bark splitting [31, p. 558] followed by canker begins on one-year-old shoots of Ontario and Cambridge gage and becomes more conspicuous with age. Where splitting does not occur the stem is often flattened or fluted and thicker two or three feet above the graft union than it is at the base. Stunting and early defoliation also occur. Several viruses cause stunting in certain varieties though the name plum stunt is used to define a virus producing small, powdery, brown pustules on the young shoots [30, p. 330].

Bud-perpetuated leaf abnormalities not caused by viruses include variegation, odd shapes ('willow' and 'oak' leaf), and the development of translucent spots which drop out.

Moore (M. H.). **Note on infection of young Peach shoots and of leaves by the brown rot fungus, Monilia fructigena.**—*Rep. E. Malling Res. Sta., 1951*, p. 148, 1 pl., 1952.

During the past two seasons infection by brown rot (*Monilia* [*Sclerotinia*] *fructigena*) has been observed in Kent on vigorous, current year shoots of the peach varieties Peregrine and Sea Eagle. It was demonstrated experimentally that infection may occur through wounds or lenticels. Spore-inoculated, unwounded leaves were also infected.

Foster (H. H.). **Organic fungicides in relation to brown rot control on Peaches.**—Abs. in *Phytopathology*, 43, 5, p. 290, 1953.

In sevenfold replicated spraying trials [at the South Carolina Agricultural

Experiment Station] for the control of brown rot (*Monilinia* [*Sclerotinia*] *fructicola*) on the Shippers Late Red peach variety in randomized single-tree plots [cf. *R.A.M.*, 29, p. 159], all were treated with parathion (1½ lb. per 100 gals.) as an insecticide, the fungicide test plots being given eight applications of fungicide. The most effective protection was conferred by wettable sulphur (6–100), followed by vancide 51 (3 pints, which caused severe foliar damage) for the first five applications and wettable sulphur for the remaining three, manzate (1½ lb.), General Chemical bis-(*p*-nitrophenol) carbonate (2 lb.), and Penn salt NP 770 (2 lb.). A power sprayer was used for all the treatments, the first of which was applied at petal-fall and the last three weeks prior to harvesting. The fruit was stored for four days at a temperature of 80° to 90° F. before the data were recorded.

Smith (L. C.). **Apricot gummosis investigations progress report, 1951–53.**—*J. Dep. Agric. S. Aust.*, 57, 2, pp. 64–65, 1 fig., 1953.

In this progress report on apricot gummosis [associated with *Cytosporina* sp.: *R.A.M.*, 32, p. 681] in South Australia it is stated that none of the spray treatments applied reduced the number of new infections. Trees receiving careful attention, with all gummosis infections cut out and all large cuts sealed, had a higher reinfection rate than those not so carefully treated. During the 1953 winter, therefore, unpruned trees were surveyed. On four completely unpruned only one gummosis infection was found and that was near a wound where a lateral had at some time been removed. In trees unpruned for several years gummosis was often present in the butts or in those parts of limbs which were originally pruned, but there were no lesions on the unpruned portions except in association with an accidental wound of some kind. On trees pruned normally 30 per cent. reinfection is usual compared with less than 1 per cent. on the unpruned.

Trials to determine the influence of modified pruning in reducing gummosis losses have been started.

Posnette (A. F.), Cropley (R.), & Ellenberger (Christina E.). **Progress in the heat treatment for Strawberry virus diseases.**—*Rep. E. Malling Res. Sta., 1952*, pp. 128–130, 1953.

This information on the inactivation of the strawberry crinkle viruses by heat [see next abstract] has already been noticed from another source [*R.A.M.*, 32, p. 262].

Posnette (A. F.) & Bovey (R.). **Field studies on virus diseases of Strawberries I. The rate of virus spread in the variety Auchincruive Climax.**—*Rep. E. Malling Res. Sta., 1951*, pp. 136–138, 1952.

At the East Malling Research Station, Kent, field plots of the originally virus-free strawberry variety Auchincruive Climax, which had been set out in successive years from 1947 to 1950 and had received routine aphid sprays, were tested for virus by means of *Pentatrichopus fragaefolii* six months and one, two, and three years after planting. Samples contained 0, 10, 50, and 100 per cent. infected plants, respectively, chiefly mild crinkle [*R.A.M.*, 32, p. 573 and preceding abstract], which emphasizes the urgent need for a means of general renewal of propagation stocks from virus-free material annually and demonstrates the importance of controlling aphids before they can migrate from infected plants.

Posnette (A. F.). **The green petal disease of Strawberry.**—*Rep. E. Malling Res. Sta., 1952*, p. 184, 1 pl., 1953.

This information has already been noticed more fully from another source [*R.A.M.*, 32, p. 632].

Moore (M. H.) & Talboys (P. W.). **Note on infection of Blackberry fruits by the brown rot fungus, Monilia fructigena.**—*Rep. E. Malling Res. Sta., 1952,* pp. 136–137, 2 pl., 1953.

Isolates from a Himalaya Giant blackberry fruit bearing pustules of *Monilia* [*Sclerotinia*] *fructigena* produced typical brown rot symptoms in Cox's Orange Pippin apple fruits; blackberry fruits were similarly infected by an isolate from the apples. The naturally infected blackberry was on an isolated bush growing in a pear orchard near Maidstone, Kent, amid abundant inoculum.

Matuo (T.). **On the effect of ultra short waves upon the Mulberry stem as well as the macroconidia of Fusarium sp. causing bud-blight of the Mulberry tree.**—*Forsch. PflKr., Kyoto,* 4, pp. 115–118, 1951. [Japanese, with English summary. Received 1952.]

Experiments in Japan showed that irradiations of 2-in. and 5-in. wavelength retarded the germination of macro-conidia of the *Fusarium* sp. which causes bud blight of mulberry [cf. *R.A.M.*, 31, p. 357]. When cut stems were exposed to the 5-in. wave they became resistant to wound inoculations with the fungus.

Massee (A. M.). **Transmission of reversion of Black Currants.**—*Rep. E. Malling Res. Sta., 1951,* pp. 162–165, 1952.

Each of the 24 normal black currant bushes artificially infected with black currant gall mites (*Phytoptus ribis*) obtained from bushes with reversion virus at East Malling developed symptoms of the virus [*R.A.M.*, 28, p. 341] in three years or less, whereas all six untreated control plants remained apparently normal throughout the experiment.

Posnette (A. F.). **New virus diseases of Ribes.**—*Rep. E. Malling Res. Sta., 1951,* pp. 133–135, 2 pl., 1952.

The following virus diseases are believed to be new. Gooseberry vein-banding [see above, p. 69], observed on most of the bushes inspected in Kent, is characterized by pale yellow, semi-transparent banding of the primary and secondary veins. If only a part of the leaf is affected it is distorted. The leaves may be slightly mottled. Individual varieties differ considerably in tolerance and symptom expression. The virus was transmitted by inarch- and saddle-grafting and by *Nasonovia ribis-nigri, Aphis schneideri,* and *A. grossulariae.*

Vein-pattern disease of black currant was first observed on a single Baldwin bush at Harrietsham, Kent, in July, 1949. The primary and secondary veins have bright yellow bands, close together near the leaf margin but separated by a widening strip of green as they approach the midrib. The bands generally join to form a line pattern. Four three-year-old Baldwin bushes and four of Wellington XXX inoculated by bark grafts in August, 1950, had developed vein-pattern by July, 1951.

Black currant yellows was observed on the leaves of cuttings of Seabrook's Black received in August, 1949, from near Oxford. Young leaves approaching maturity display yellow flecking on the fine veins, followed by a yellowish-green mottle. By the end of June segments of affected leaves are yellowish-green. The yellow pattern is frequently accompanied by slight puckering of the interveinal areas. Four plants of Baldwin and four of Wellington XXX developed symptoms on bark-grafted shoots the following year. Even on plants infected for two years the symptoms were usually confined to shoots arising from or near the inoculated branch.

Only healthy propagating material should be used. Effective aphid sprays should help to control gooseberry vein-banding.

Issa (E.). **Doenças em Oliveiras quarantenadas.** [Diseases of quarantined Olives.] —*Biológico*, 19, 5, pp. 93–98, 3 figs., 1953.

The principal disorders developing in a quarantine nursery in olive plants imported from Portugal into São Paulo, Brazil, appeared to be of physiological origin and included a form of chlorosis similar to that reported by Pesante from Italy [*R.A.M.*, 18, p. 537; cf. also 23, p. 69; 30, p. 377]; superbudding, recognizable by the production of innumerable sickly branches with stunted leaves; fasciation with excessively luxuriant foliage and normal branches arising from affected shoots; and opaque spot, characterized by the formation of pale green, opaque leaf lesions, up to 10 by 1 mm., resembling those described as a particular manifestation of *Cycloconium oleaginum* [21, p. 403], which did not, however, seem to be present.

Hingorani (M. K.) & Mehta (P. P.). **Bacterial leaf spot of Pomegranate.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 55–56, 2 figs., 1953.

Light brown spots 2 to 5 mm. in diameter, becoming dark brown, coalescent, and surrounded by a watersoaked margin, appeared on pomegranate leaves at the Indian Agricultural Research Institute, New Delhi, during the summer of 1951. Isolations and inoculation experiments demonstrated that the causal agent was a short rod (1 to 2·5 by 0·5 μ), Gram-negative, motile, non acid-fast, aerobic bacterium having an optimum growth temperature of 30° C. and a thermal death point of about 52°.

Purss (G. S.). **A disease in Williams Hybrid Bananas produced by Fusarium sp.**— *Qd J. agric. Sci.*, 10, 2, p. 126, 1953.

A banana disease, resembling Panama disease (*Fusarium oxysporum* f. *cubense*) [*R.A.M.*, 32, pp. 200, 634], was observed in 1950 on three Williams Hybrid plants, hitherto immune from the disease, in the Beenleigh district of Queensland. A species of *Fusarium*, differing from *F. o.* f. *cubense* in the colour produced on rice and potato dextrose agar media, was isolated from the diseased tissue and proved pathogenic to the Lady Finger banana variety also. *F. o.* f. *cubense* did not attack Williams Hybrid in the test.

Issa (E.). **A 'cercosporiose' da Bananeira.** ['Cercosporiosis' of Banana.]—*Biológico*, 19, 4, pp. 65–73, 1 col. pl., 3 figs., 1953.

In connexion with the recent development of epiphytotics of banana leaf spot (*Mycosphaerella musicola*) in Rio de Janeiro and São Paulo, Brazil [C.M.I. map No. 7; *R.A.M.*, 28, p. 529], essential information is presented on the economic importance, etiology, symptomatology, and control of the disease, varietal reactions, and predisposing factors.

McKnight (T.). **The woodiness virus of the Passion Vine (Passiflora edulis Sims).**— *Qd J. agric. Sci.*, 10, 1, pp. 4–35, 18 figs., 4 diags., 1953.

Passion fruit woodiness virus [*R.A.M.*, 27, p. 533] is the most dangerous disease of the plant in the eastern States of Australia. In this detailed study on the epiphytology, symptomatology, and transmissibility of the virus in Queensland a complete series of symptoms (13 distinct types in all, including seasonal variations of each) is described and also the symptom reactions of *Passiflora foetida*, *P. suberosa*, *P. edulis* f. *flavicarpa*, and *P. alba*. *P. suberosa*, *P. foetida*, and *P. alba* occur wild throughout south Queensland, and the last-named, which is common and almost universally infected, is regarded as an important reservoir of infection.

Initial infections of new plantings are as a rule at a maximum in places adjacent to a diseased source. Despite the continuous reservoir of infection in Queensland, local isolation within a farm usually ensures freedom from the virus for ten months after planting.

The known aphid vectors of the virus [loc. cit.] do not colonize the vine by choice but breed on weeds and other plants in and around the plantations. In greenhouse experiments the virus was readily transmitted by the spatula-carborundum technique, by leaf grafting, and by leaf insertion under the cambium at 72·2° to 106·4° F., symptoms being expressed in infected seedlings seven (at 98·1°) to 24·6 (at 73·2° to 79·5°) days after inoculation.

Selective mechanical and leaf graft transmissions indicate that the relative concentrations of the different components of the virus can be altered. Thus, the fern leaf symptom was segregated from the virus mixture and maintained free from the typical mottle symptom. The latter was found to be responsible for the production of the characteristic terminal bending reaction. The woodiness virus as it occurs in Australia appears, therefore, to be a complex of strains and not a single entity.

Though the virus has been referred to cucumber mosaic virus [loc. cit.] it was not possible in these studies to secure mechanical transference of the woodiness virus to tomato, *Datura stramonium*, cucumber, tobacco, or *Lupinus mutabilis*.

ZENTMYER (G. A.). **Avocado root rot research.**—*Calif. Citrogr.*, 38, 7, pp. 256–257, 1953.

In California avocado root rot caused by *Phytophthora cinnamomi* occurs chiefly in poorly drained soils. Investigations on control [*R.A.M.*, 27, p. 483; 31, p. 338, and next abstract] under way at Riverside in co-operation with the University of California, Los Angeles, and the Agricultural Extension Service include a search for resistant stocks [cf. loc. cit.] among collections made in swampy locations in central America and Mexico during the summer of 1952, replanting infested soils with [specified] resistant crops, the compilation of a host list of the fungus [30, p. 128], experiments on various soil treatments and amendments and on irrigation methods, an investigation of the occurrence of the pathogen in indigenous soils, and a study of the biology of *P. cinnamomi* itself [32, p. 702].

Points to remember in planting a new grove are the use of well-drained soil, vigorous nursery stock, and adequate but not excessive irrigation. Infection in a diseased grove may be reduced by irrigating the trees individually, because infected ones require less water than healthy, by cutting back severely affected trees to restore a top-root balance, raking 100 to 200 lb. lucerne meal under the trees (not effective in all soils), and maintaining a dry zone at the margin of an infested area to prevent spread to healthy trees. If only a few trees are involved they may be removed and the whole area fumigated.

CROSS (G. F.). **Avocado trunk rot.**—*Fmg in S. Afr.*, 28, 327, pp. 210–211, 3 figs., 1953.

During the past three years trunk rot of avocado caused by *Phytophthora cinnamomi* [*R.A.M.*, 32, p. 366 and preceding abstract] has occurred in the Transvaal at Nelspruit and Hartebeestpoort, and particularly in the higher areas of Schagen, Tzaneen, and Duiwelskloof which are best suited to commercial avocado production. The disease is active only during the wet summer months, especially in the higher rainfall areas where the upward spread [in the trunk] may attain 5 to 6 ft. during the first season. It generally attacks trees that are ten years old or more. Although root rot is apparently caused by the same organism [loc. cit.], the roots of trees with trunk rot seem to be unaffected. The dark brown discoloration extends into the wood to a depth of about $\frac{1}{8}$ in. In both bark and wood the healthy and less severely affected tissues are clearly demarcated from the severely affected. Two West Indian seedlings and the varieties Nabal, Linda, Collinson, Mayapan, Fuerte, and Dickey A are field susceptible, particularly the last four [cf. 32, p. 135].

For successful control the plantation should be inspected every three to four weeks during spring and summer. At the first signs of attack all diseased tissue and healthy tissue to a depth of at least 1 in. should be cut away and the wounds covered with Bordeaux paste.

Uppal (B. N.), Patel (M. K.), & Kamat (M. N.). **Black spots of Mango fruits.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 44–46, 3 figs., 1953.

The fungus associated with black spot of mango fruits, first observed in 1937 in the coastal areas of Bombay State, is designated *Actinodochium jenkinsii* n.sp. [*R.A.M.*, 29, p. 508]. A wound parasite, it is characterized by hyphae measuring 3·5 to 10·5 μ, cylindrical, catenulate conidia 5 to 13 by 3 to 5 (average 9 by 4) μ, and catenulate, smooth-walled chlamydospores 6 to 14 (average 9) μ [in diameter]. Optimum mycelial growth was secured at 30° C. at pH 6 to 7, the optimum for conidial germination being 26° (minimum 10° and maximum above 40°). The organism was pathogenic to fruits of Alfonso and Piari mango, producing dark, round, necrotic spots 0·1 to 1 mm. [in diameter]. The optimum for infection occurred at 30° to 35° after incubation for 72 hours.

Linnasalmi (Annikki). **Några synpunkter angående jorddesinfektionsfungicidernas effektivitetsundersökningar.** [Some points of view concerning studies on the efficiency of soil disinfection fungicides.]—*Nord. JordbrForskn.*, *1951*, 2–3, pp. 500–501, 1951.

Some factors to be taken into account in the assay of soil fungicides are briefly considered in this contribution to the eighth Congress of the Scandinavian Agricultural Research Workers' Association, held in Helsinki in June, 1950. For testing it is advisable to select one common organism which is readily destroyed and one specially resistant pathogen, such as *Sclerotinia* or *Rhizoctonia* sp., using a particularly susceptible host as the test plant. Environmental conditions should be such as further the parasitic activity of the pathogen without unduly impairing host development, and the soil should be sterilized. A fungicide effective under these conditions will be even more so in an unsterilized medium. In greenhouse inoculation experiments against damping-off at a Finnish institution [*R.A.M.*, 32, p. 412] soilicide (a paradichlorobenzol preparation from Pan Britannica Industries, Ltd., England) gave reasonably good control of *Pythium* spp.

Tanaka (S.). **Studies on factors influencing the fungicidal value of Bordeaux mixture.**—*Forsch. PflKr., Kyoto*, 4, pp. 145–159, 1951. [Japanese, with English summary. Received 1952.]

The fungicidal power of Bordeaux mixture, with different qualities and quantities of lime and with chemicals and spreaders added, was tested *in vitro* by the spore germination method. Glass slides were treated with a collodion solution, then the Bordeaux mixture was sprayed on. A loop containing a spore suspension of *Alternaria kikuchiana* [*R.A.M.*, 32, p. 134] was smeared on the dried slide and incubated in a moist chamber at 28° C. for 24 hours. Fungicidal efficiency was gauged by the percentage inhibition of germination. It was found that quicklime was the best type of lime, slaked was next, while weathered lime was greatly inferior. The greater the quantity of lime the better the fungicidal value of Bordeaux, and the more resistant to leaching by water. The addition of zinc sulphate, magnesium sulphate, lead arsenate, and calcium arsenate increased the fungicidal value of Bordeaux, but iron sulphate, wettable sulphur, manganese sulphate, and lubricating oil all reduced it. The keeping of ready-mixed Bordeaux mixture reduced its fungicidal power, but more slowly when kept as a powder. The fungicidal efficacy

of the spray was at a maximum when the temperature was near optimum for spore germination. It increased in proportion to the length of time the spores were wetted with water prior to application.

Byrde (R. J. W.), Crowdy (S. H.), & Woodcock (D.). **Studies on systemic fungicides. III. The activity of certain chlorine-substituted β-naphthols and naphthyloxy-*n*-aliphatic carboxylic acids as systemic fungicides.**—*Ann. appl. Biol.*, 40, 1, pp. 152–165, 2 graphs, 1953.

In further studies on the effect of systemic fungicides on the infection of broad beans by *Botrytis fabae* [*R.A.M.*, 31, p. 445] a number of compounds were tested on infected plants at Long Ashton Research Station, on the growth *in vitro* of the mycelium of *B. fabae*, and on the germination of spores of *Sclerotinia laxa* [31, p. 291].

The systemic tests revealed no difference in the activity of the compounds associated with different side chains, though slight but significant effects were associated with different chlorine substitutions in the naphthalene nucleus. The 3:4-dichloro-2-naphthol derivatives were the most effective compounds tested, but were the least toxic *in vitro*.

The toxicity of the 1:3-dichloro-2-naphthol derivatives to the spores of *S. laxa* increased with increasing length of side chain. Effectiveness of the chlorine-substituted compounds in suppressing growth of *B. fabae* was in the following descending order: 1:3:4-trichloro-, 1:3-dichloro-, 1:4-dichloro-, and 3:4-dichloro-compounds. The concentrations necessary in agar culture to reduce the growth of *B. fabae* comparable with that in the leaf could reasonably be expected to occur in bean plants treated with the 2-naphthyloxyacetic acids at 10 p.p.m.

Perrot (E.), Fabre (R.), Lutz (L.), Raoul (Y.), Valette (G.), Cavier (R.), & Desrue (A.). **Manuel de phytopharmacie. Tome I. Tome II. Tome III.** [Manual of phytopharmacy. Volume I. Volume II. Volume III.]—I, 618 pp., 8 pl., 1948; II, 368 pp., 155 figs., 1949; III, 409 pp., 68 figs., Paris, Masson & Cie, 1949. [Received August, 1953.] Fr. 1,535, 910, 1,345.

Volume I of this useful and exhaustive treatise comprises two sections: (1) general information on the diseases and pests attacking cultivated plants in France and their control, and (2) a fully documented survey of French phytopharmaceutical legislation, the official texts of the operative decrees being followed by explanatory comments.

Volume II is divided into two parts, the first dealing with insect pests and the second (190 pp.) with fungal, bacterial, and virus diseases. Following an outline of the classification of fungi parasitic on economic plants the authors discuss diseases caused by hyphomycetes common to various hosts; virus diseases; and the principal diseases of the various crops.

Volume III is concerned with the chemistry, pharmacology, and toxicology of phytopharmaceutical products. The first part, by Fabre and Raoul, contains an introductory chapter, one giving a systematic account of phytopharmaceutical liquid products, and others dealing with solid products, gaseous products, seed protectives, and soil treatments. The second part of the volume is by A. Desrue and is concerned with methods of treatment and the materials used.

Brown (I. L.). **Care of spray equipment.**—*N.Z. J. Agric.*, 86, 6, pp. 545, 547, 549, 7 figs., 1 diag., 1953.

Useful, detailed instructions are given for the care and maintenance of spraying equipment during operation and in storage.

Clifton (C. E.), Raffel (S.), & Barker (H. A.). **Annual review of microbiology. 6.**—ix+492 pp., 2 figs., Stanford, California, Annual Reviews, Inc., 1952. $6.

In this review [cf. *R.A.M.*, 31, p. 196] 21 papers are included, summarizing current work in microbiology. J. L. Stokes (pp. 29–48) surveys the literature up to December, 1951, on the nutrition of bacteria, fungi [loc. cit.], algae, and protozoa (129 references). R. W. Kaplan (pp. 49–76) deals with the progress in microbial genetics [31, p. 197] in 1950 and up to November, 1951, including some of the author's earlier investigations little known outside Germany (320 references). H. L. Jensen (pp. 77–90) discusses (with 75 references) the coryneform bacteria, and concludes that a large part of the non-spore-forming, Gram-positive bacteria may be arranged in a continuous sequence ranging from *Corynebacterium* to *Nocardia* and thence to *Streptomyces* and *Micromonospora*, the whole constituting the order Actinomycetales. C. H. Andrewes (pp. 119–138) discusses (with 72 references) the classification and nomenclature of viruses [28, p. 618]. The majority of virus workers are in favour of the suggestion that virus nomenclature should be dated from a time to be decided upon. The present state of knowledge of the identification of virus infections in plant tissue (up to December 1951) is discussed by J. H. Jenson (pp. 139–150). The various aspects are dealt with under the headings of chemical tests, chromatography, ultra-violet light, electrophoresis, and intracellular inclusions (60 references). A. G. Lochhead (pp. 185–206) surveys the developments from 1948 to the end of 1951 in the field of soil microbiology (196 references). L. J. Wickerham (pp. 317–332) discusses advances in the taxonomy of yeasts [31, p. 567] from 1948 to 1952 (38 references). The problem of bacteriophages [32, p. 616] is summarized by W. H. Price (pp. 333–348, 97 references). J. L. Harley (pp. 367–386) deals with the mycorrhizal associations between micro-organisms and higher plants (96 references) [32, p. 442].

Advances in Agronomy. Volumes III and IV.—x+361 pp., 5 figs., 2 maps, 1 graph, 1951; xi+416 pp., 21 figs., 37 graphs, 1 map, 7 diags., 1952, New York, Academic Press Inc.; London, Academic Books, Ltd., $7.80; $8.50.

Volume III [cf. *R.A.M.*, 30, p. 480], edited by A. G. Norman, contains eight papers of agronomical interest including one on the chemistry of soil potassium by R. F. Reitemeier, in which he deals with its relationship to soil micro-organisms, and one by G. W. Burton on the adaptability and breeding of suitable grasses for the south-eastern United States. In this the author states that ergot (*Claviceps paspali*) [28, p. 67], eyespot (*Helminthosporium* sp.), and *Rhizoctonia* sp. have been found on Bahia grass (*Paspalum notatum*) in this region, but the damage caused by these diseases is not extensive. Bahia (P. I. No. 148996) from Argentina has remained completely immune from *H. sativum* at Tifton, Georgia. The yield and quality of common Bermuda grass (*Cynodon dactylon*) are reduced by *H.* leaf spots; Coastal Bermuda is much more resistant. *Claviceps paspali* is partly responsible for the poor quality of Dallis grass (*P. dilatatum*) in the United States [24, p. 233]; anthracnose (*Colletotrichum graminicola*) attacks the leaves, and may prove fatal. Italian ryegrass (*Lolium multiflorum*) is often attacked by rust (*Puccinia* sp.), which hastens its death. Breeding for resistance has solved the problem of failures due to the susceptibility of Napier grass (*Pennisetum purpureum*) to eyespot (*H. sacchari*) [29, p. 477]. *Sclerotium rolfsii*, *H.* sp., and *Gloeocercospora* sp. have been found on pearl millet (*P. glaucum*) as the seeds begin to mature, but do not seem to attack the seedlings. St. Augustine grass (*Stenotaphrum secundatum*), used chiefly for lawns, is killed during warm, damp weather by brown patch [*Corticium solani*]. Volume IV, also edited by A. G. Norman, contains nine contributions. F. A. Gilbert reviews work (pp. 147–177) on copper in relation to nutrition [*R.A.M.*, 32, pp. 133, 429, 619; 33, pp. 26, 48]. He discusses (with 192 references) the present state of knowledge as to its value to the plant, the effects of deficiency and geographical

areas where it is prevalent, and copper in the soil. Dealing with possible toxic effects of copper, he states that the growth of tomatoes in nutrient solution was depressed by a concentration of only 1 p.p.m., but some growth resulted in acid-washed sand when the nutrient contained 5 p.p.m. The occurrence of copper toxicity on extremely sandy Australian soils with applications of 10 lb. copper sulphate per acre [22, p. 37] appears to be an exceptional case. In the author's experiments in Ohio the addition of 20 lb. per acre every year since 1946 to certain vegetable plots has slightly increased yield compared with the untreated, with no evidence of toxicity. A second batch of seedlings planted in soil with enough copper sulphate to kill the first sowing grew and bore fruit. In view of these results it seems unlikely that copper toxicity would ever occur on ordinary agricultural land as a result of the accumulation of copper in the soil.

E. G. Mulder and F. C. Gerretsen (pp. 221–277) review and discuss recent research on soil manganese in relation to plant growth [32, p. 277] (221 references) under the headings manganese determination, manganese in the soil, the role of micro-organisms in transforming manganese compounds, symptoms of manganese deficiency in plants, manganese content of plants, correcting deficiency, manganese nutrition and fertilizer interactions, manganese toxicity and the function of manganese in plants. J. Hudig informed the authors in a personal communication that in northern Holland, on the borderline between an acid sandy peat and a clay soil, grey speck (manganese deficiency) of oats [32, p. 542; 33, p. 49] was common, whereas on both sides of this line the oats were perfectly healthy, the most plausible inference being that the pH of the peaty soil had been raised by the clay to a level at which manganese was insoluble.

Ingold (C. T.). **Dispersal in fungi.**—197 pp., 90 figs., 8 pl., London, Geoffrey Cumberlege, Oxford University Press, 1953. 18*s.* (in U.K. only).

This is a beautifully illustrated and very readable book dealing with the structure of the fungi in relation to dispersal and examining the dynamic processes of spore liberation. The dispersal of spores by wind, insects, larger animals and man, and water is described, and seed-borne fungi are also reviewed. Some of the information on the mechanism of spore discharge is included in a previous book [*R.A.M.*, 18, p. 405].

Tochinai (Y.). **The functional resistance in plants.**—*Forsch. PflKr., Kyoto*, 4, pp. 1–8, 1951. [Japanese, with English summary. Received 1952.]

The author reviews types of disease resistance in plants [cf. *R.A.M.*, 26, p. 22] and discusses his concept of functional resistance, residing in the dynamic activities of the protoplasm. The development of functional resistance, which is much influenced by environmental conditions, would serve as a useful basis for breeding resistant plants [cf. 5, p. 246; 33, p. 4].

Mori (S.). **On the effect of sunlight upon the antagonistic action of Actinomyces to plant disease fungi.**—*Forsch. PflKr., Kyoto*, 4, pp. 129–132, 1951. [Japanese, with English summary. Received 1952.]

The antagonism of strain No. 5 of *Actinomyces* sp. [*R.A.M.*, 29, p. 575] to *Ophiobolus miyabeanus*, *Corticium gramineum*, and *Macrosporium bataticola* [33, p. 40] on culture media was hindered considerably by direct sunlight, probably due to the destruction of antagonistic substances by ultra-violet rays.

Helson (G. A. H.). **Diseases of horticultural crops and plants in New Zealand.**—*Circ. Dep. Agric. N.Z., Hort. Div.*, 1, 30 pp., 1952. [Received 1953.]

This tabulated list of diseases, hosts, and causal agents recorded as affecting horticultural crops and plants in New Zealand has been compiled from previous

lists [*R.A.M.*, 33, p. 53] and is primarily for the use of the regulatory services responsible for plant quarantine.

YADAV (A. S.). **Some new hosts of Cephaleuros from Bihar.**—*Curr. Sci.*, 22, 9, p. 280, 1953.

A list is given of several new hosts of *Cephaleuros* [cf. *R.A.M.*, 32, p. 103] collected from different parts of Bihar, India. The alga was found in the tissues of *Mimusops hexandra* and guava [30, p. 279], both from Patna.

OLIVE (L. S.). **The structure and behavior of fungus nuclei.**—*Bot. Rev.*, 19, 8–9, pp. 439–586, 7 pl., 1953.

This paper reviews the work done on the nuclear cytology of the fungi [cf. *R.A.M.*, 31, p. 196] during the past 25 years, including a few more important cytological studies prior to this period. A bibliography of some 450 titles is appended.

ESPENSHADE (M. A.). **A technique of mounting fungal colonies for museum specimens.**—*Mycologia*, 45, 2, pp. 309–312, 1 fig., 1953.

Small fungal colonies or sectors of larger colonies killed with chloroform are dried on glass slides, each being then mounted and sealed in a 35 mm. film-mounting frame. The mounts must be stored where they cannot rub against one another. Specimens preserved in this way have retained their natural colours.

WEAVER (E. A.), CORDON (T. C.), & JOHN (H. J.). **Closure for culture bottle.**—*Mycologia*, 45, 2, pp. 307–309, 1 fig., 1953.

A bottle-cap assembly devised as a substitute for a cotton plug, particularly suitable for wide-mouthed bottles, is described. The centre of the standard screw-on cap is removed and the whole of the upper surface is covered with three to 12 layers of wet filter paper. A prepared glass sleeve fits tightly over the cap and rests on the shoulders of the jar. A rubber band between the cap and filter paper prevents it slipping when the glass sleeve is turned to remove the cap. Improved spore production was secured with this type of closure.

TALBOYS (P. W.). **A method for the study of the effects of Verticillium toxins on the water relations of cut shoots.**—*Rep. E. Malling Res. Sta., 1951*, pp. 149–151, 1 diag., 2 graphs, 1952.

An apparatus was developed at East Malling Research Station for determining simultaneously the water uptake and water loss by a detached shoot, based on that employed by Gäumann and Jaag [*R.A.M.*, 26, p. 361]. The shoot is enclosed in a sealed bell jar, water uptake determined by means of a calibrated potometer tube in gm. per hour, and the water transpired estimated by absorption in sulphuric acid. Normally uptake of distilled water by a hop shoot slightly exceeds loss. When a culture filtrate of *Verticillium albo-atrum* is used the loss greatly exceeds the uptake, resulting in a progressive desiccation of the leaves.

LECHEVALIER (H.), ACKER (R. F.), CORKE (C. T.), HAENSELER (C. M.), & WAKSMAN (S. A.). **Candicidin, a new antifungal antibiotic.**—*Mycologia*, 45, 2, pp. 155–171, 3 figs., 1 graph, 1953.

In studies at New Jersey Agricultural Experiment Station of 197 cultures of actinomycetes tested for antibiotic activity, a strain of *Streptomyces griseus* was found which produced an antibiotic very active against yeasts, yeast-like fungi, and *Ceratostomella ulmi*. Because of its strong fungistatic and fungicidal effect on *Candida albicans*, the new antibiotic is named candicidin. It completely inhibited growth of *Ceratostomella ulmi* at a dosage of 0·15 to 0·3 μgm. per ml.

Wallen (V. R.) & Skolko (A. J.). **The inactivation of antifungal antibiotics by chlorine.**—*Plant Dis. Reptr*, 37, 8, pp. 421–424, 2 figs., 1953. [Multilithed.]

At the Division of Botany and Plant Pathology, Ottawa, soaking pea seed in water for 18 hours and drying for one week at room temperature reduced seed-borne infection by *Ascochyta pisi* [*R.A.M.*, 31, p. 528] from 63·8 (unsoaked) to 11·8 per cent. and increased germination from 68·6 to 84·8 per cent. in one seed sample. When this treatment was followed by immersion for 15 minutes in 2 per cent. chlorine solution the percentage infection was 79·6, while germination was not much altered (72·8 per cent.).

The suggestion that an antibiotic substance is produced during the soaking of pea seeds was supported indirectly by a similar inactivation of known antifungal antibiotics by chlorine. Small paper disks were dipped in each antibiotic solution and then placed on pea agar seeded with *A. pisi*, which was completely inhibited by actidione. The addition of chlorine to the antibiotic solution inactivated actidione, thiolutin, and to a lesser extent gliotoxin and helixin B [32, p. 394], allowing complete or partial overgrowth by the fungus.

Nandi (P.) & Sen (G. P.). **An antifungal substance from a strain of B. subtilis.**—*Nature, Lond.*, 172, 4384, pp. 871–872, 1953.

At the Microbiological Laboratory, Bose Institute, Calcutta, India, strain B(X) of *Bacillus subtilis* [*R.A.M.*, 32, p. 687] produced a substance which inhibited the growth of *A*[*spergillus*] *niger* [31, p. 621] at a minimum concentration of 12 μgm per ml., *P*[*enicillium*] *notatum* (12 to 15), *A. oryzae* (20 to 25), *Alternaria solani* (25), *Pythium* sp. (200), *Fusarium* sp. (30) [cf. 31, p. 540], and *B*[*otrytis*] *cinerea* (15) [31, p. 271; 32, pp. 89, 330], and was also active against *Curvularia* sp., *Verticillium* sp., *Phoma* sp., *P. rotundum*, and *Trichophyton* sp. at 0·2 μgm per ml. The substance differed in its antibiotic activities from other antifungal products of *Bacillus subtilis*.

Koba (S.). **Patho-physiologic studies of spotted diseases of plants. I. Unusual distributions of starch-grains in the diseased leaves.**—*Sci. Bull. Fac. Agric. Kyushu Univ.*, 14, 1, pp. 35–42, 6 figs., 1953. [Japanese.]

Comparative studies on the distribution of assimilated starch on the periphery of the leaf lesions of 135 different leaf-spot diseases were made by the iodine method. Within the periphery of a spot bordered by or isolated from a vascular bundle was a band 1 to 3 mm. in width with no starch, while a spot connecting diseased bundles with healthy tissue was accompanied by more extensive disappearance of starch. In general, the area with no starch was wide under conditions of both high temperature and humidity or in lesions on old or lower leaves. These observations apply to leaf-spot fungi as a whole, but in cases of infection by *Cladosporium* or *Cercospora* spp. starch accumulates at the margin of the lesion.

Jurkowska (Mlle H.). **Investigations on the adaptability of Aspergillus niger to copper.**—*Bull. int. Acad. Cracovie*, Sér. B, 4 (*1951*), 4–10, pp. 167-201, 2 pl., 5 figs., 4 graphs, 1952. [Received November, 1953.]

Experimental work in the Department of Agricultural Chemistry of the Jagiellonian University, Poland, indicated that a strain of *Aspergillus niger* became adapted to 0·449 per cent. copper sulphate after several generations, eventually growing well and sporulating, though at first this concentration was very toxic. This derived tolerant form differed from the original in being resistant to other soluble copper salts, the salts of zinc, nickel, and manganese, and to a very low pH,

but not to a high sugar concentration. After 15 generations on a medium containing no copper this form of *A. niger* did not return to the original form, but lost its copper resistance.

Allen (P. J.). **Toxins and tissue respiration.**—*Phytopathology*, 43, 5, pp. 221–229, 2 graphs, 1953.

This review of 56 contributions to the literature on respiratory changes in diseased plant tissue, presented at the Symposium on Physiology of Parasitism at the 44th Annual Meeting of the American Phytopathological Society at Ithaca, New York, on 9th September, 1952, is devoted mainly to evidence for the widespread occurrence of augmented respiration as an early response to the action of toxins on higher plants and to an analysis of the underlying causes. The generally inhibitory effect upon respiration and respiratory enzymes of toxins active against micro-organisms is also emphasized. The function of such toxins may be to defend the plant against an invader or competitor. The eventual understanding of this action will depend upon a knowledge of how and when the enzyme systems are affected.

Dimond (A. E.) & Waggoner (P. E.). **On the nature and role of vivotoxins in plant disease.**—*Phytopathology*, 43, 5, pp. 229–235, 1953.

In this review of 59 contributions to the literature on the nature and function of toxins in plant disease [cf. preceding and next abstracts], presented at the Symposium on Physiology of Parasitism at the 44th Annual Meeting of the American Phytopathological Society at Ithaca, New York, on 9th September, 1952, the new term 'vivotoxin' is proposed to remedy the confusion which has arisen from loose usage of the word 'toxin'. A 'vivotoxin' is defined as a substance produced by the pathogen or its host, or both, which operates in the causation of disease but is not itself the primary agent. On the other hand, a toxin is any phytotoxic compound secreted by a micro-organism. Koch's postulates are modified to establish the following criteria for the proof of pathogenicity of vivotoxins: (*a*) reproducible separation from the diseased plant, (*b*) purification, and (*c*) reproduction of at least a part of the pathological syndrome when the substance is introduced into a healthy plant.

The problem of the demonstration of the vivotoxicity of a toxin is discussed in terms of lycomarasmin, which does not appear, from the available evidence, to be initially responsible for the tomato wilt associated with *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* [*R.A.M.*, 33, p. 56 and below, p. 122].

Wheeler (H. E.). **Detection of microbial toxins by the use of radioisotopes.**—*Phytopathology*, 43, 5, pp. 236–238, 1953.

In a paper presented at the Symposium on Physiology of Parasitism at the 44th Annual Meeting of the American Phytopathological Society at Ithaca, New York, on 9th September, 1952, the author sums up 19 contributions (including three of his own) to the literature on the application of radio-isotopes to the detection of toxins produced by a pathogen within plant tissues [cf. preceding abstracts] and their distinction from reaction products of the host, and concludes that such an approach to the problem is feasible. Carbon ^{14} and tritium (used as a tracer for carbon) would seem to be the most generally useful radio-isotopes for the production of labelled toxins in host tissues by tagged pathogens. Promising methods for the demonstration and assay of such toxins include autoradiography [*R.A.M.*, 32, p. 333] and chromatography (M. D. Kamen: Radioactive tracers in biology. Second edition, 429 pp., Academic Press Inc., New York, 1951; *Plant Physiol.*, 26, pp. 174–181, 1951).

Takahashi (M.). **Studien über die giftigen Wirkungen der durch Pythium ultimum gebrauchten Nährlösungen auf verschiedene Pflanzen.** [Studies on the toxic effects of the nutrient solutions used by *Pythium ultimum* on various plants.]—*Forsch. PflKr., Kyoto*, 4, pp. 138–144, 1951. [Japanese, with German summary.]

The most copious production of a thermostable, filterable toxin by *Pythium ultimum* in Czapek's solution plus 3 per cent. saccharose occurred when potassium nitrate was used as the source of nitrogen and the cultures were maintained for 30 days at 28° C. In solutions adjusted to pH 2 the substance is largely adsorbed by fuller's earth and may be precipitated by alcohol and extracted with ether. Its toxic action on plants is particularly noticeable in neutral solutions. The toxin appears to be taken up by the roots and distributed throughout the plant. It is toxic to many species of plants, but rice is uninjured and the effect on barley is very weak.

Stevenson (F. J.) & Akeley (R. V.). **Control of Potato diseases by disease resistance.**—*Phytopathology*, 43, 5, pp. 245–253, 1953.

Up-to-date information on the breeding of potatoes for resistance to disease is reviewed in this paper, presented at the Symposium on Disease Resistance at the 44th Annual Meeting of the American Phytopathological Society at Ithaca, New York, on 8th September, 1952. Many of the 48 contributions listed in the bibliography have been noticed from time to time in this *Review*.

Fukushi (T.) & Tanaka (I.). **Influence of climate on virus diseases of Potato.**—*Forsch. PflKr., Kyoto*, 4, pp. 8–16, 1951. [Japanese, with English summary. Received 1952.]

Potato tubers infected with crinkle mosaic [potato viruses X+Y: *R.A.M.*, 31, p. 202; 32, pp. 640, 690, and next abstract] were planted in the foggy belt on the eastern coast of Hokkaido, Japan. It was found that the symptoms of the disease became milder, but after five years the tubers were not entirely free from the virus. This climate had no effect on potato leaf roll.

Murayama (D.), Yamada (M.), & Matsumiya (H.). **Immunological studies on the Potato virus diseases. I. Physical and chemical resistance of X and Y virus antigens.**—*Forsch. PflKr., Kyoto*, 4, pp. 71–80, 1951. [Japanese, with English summary. Received 1952.]

The source of potato virus X [*R.A.M.*, 31, p. 76, and preceding abstract] used in these experiments [at Hokkaido University, Japan] was sap from White Burley tobacco which had been inoculated with sap from potato leaves infected with crinkle mosaic (potato viruses X+Y) [loc. cit.] and heated to 60° C. for ten minutes. Virus Y was obtained by colonizing *Nicotiana sylvestris* plants with *Myzus persicae* which had been fed on the potato plants affected with crinkle mosaic.

Virus X lost its antigenicity when heated to 66° to 70° C. for ten minutes, while Y lost both antigenicity and infectivity at 52° to 54°. Formaldehyde rendered virus Y non-infective without affecting its ability to react with antiserum.

Virus X was rendered serologically inactive by 3 per cent. phenol, and Y by 2 per cent. Serological activity of virus X was eliminated or reduced by ether, benzene, and 70 per cent. acetone, but was not affected by alcohol (50 to 85 per cent.), potassium permanganate, hydrogen peroxide, or mercuric chloride, while that of Y was decreased by ether, alcohol (50 to 70 per cent.), and acetone (50 to 70 per cent.). Infectivity of virus Y was prevented by 1 in 500 mercuric chloride. Virus X lost its antigenicity at pH 3 but retained it at pH 8, 9, and 10, while Y lost its activity at pH 3 or 4 and 9 and above.

Bercks (R.). **Über die Möglichkeit einer Virulenzveränderung des Kartoffel-X-Virus.** [On the possibility of a change in virulence of Potato virus X.]—*Phytopath. Z.*, 20, 2, pp. 113–120, 1953.

Further experimental evidence is presented from the Brunswick branch of the German Biological Institute regarding the decline in virulence of four strains (Cs A, H 19 m, Us v, and Bm) of potato virus X [cf. *R.A.M.*, 32, p. 500], which behaved similarly to Cs 35 in inoculation tests on the Flava and Capella varieties [30, p. 428] after prolonged culture in tobacco. A strain of the virus from Flava lost most of its virulence after 12 passages through tobacco and all by the end of 19. Strains of virus X from the carrier varieties Direktor Johanssen and Kaiserkrone failed to infect Capella even after a year's culture in Flava.

It is apparent from these results that X viruses cultured in tobacco cannot be unreservedly compared and still less equated with those from potato.

Marcus (O.). **Über die Y-Virus-Verseuchung der Knollen primär infizierter Kartoffelpflanzen.** [On the Y virus infection of the tubers of primarily infected Potato plants.]—*Phytopath. Z.*, 20, 2, pp. 121–132, 3 diags., 1952.

At the Plant Protection Station, Kassel-Harleshausen, Germany, potted Ackersegen potato plants were inoculated on 4th and 15th June, 11th July, and 13th August, 1951, with a strain of potato virus Y from two sources, one cultured in tobacco and the other in potato. The tobacco material infected the tubers of plants inoculated at 29 days old more severely than those 18 days old, but in neither group were all the tubers affected, whereas potato inoculum produced 100 per cent. infection in both classes. Some tubers of the plants inoculated when 55 or 88 days old with material from both sources were partially or wholly infected, while others were virus-free. Tobacco-Y caused more severe symptoms than potato-Y, especially in younger plants, and it is concluded that passage through tobacco not only enhances the virulence of virus Y but causes changes in the virus molecule. In field plants inoculated on 16th June the maximum degree of infection was in the tubers produced by the inoculated stems.

Sakimura (K.). **Potato virus Y in Hawaii.**—*Phytopathology*, 43, 4, p. 217, 1953.

A mixed natural infection of potato virus Y and [tomato] spotted wilt virus was observed in field plantings of tomato in Hawaii in 1950 and 1951. Virus Y was isolated after subinoculation on *Nicotiana glutinosa* and investigated at the Pineapple Research Institute in respect of physical properties, host range, symptomatology, and vectors. The results of these studies confirmed Parris's determination of potato virus Y, which was first recognized in Hawaii in 1937 [*R.A.M.*, 18, p. 222; 19, p. 432].

The thermal inactivation point lay between 53° and 56° C. for a 10-minute exposure; longevity *in vitro* ranged from 48 to 72 hours at 25° to 29° and from 66 to 82 days at 0° to 3°; and the dilution end point was between 1 in 300 and 1 in 1,000. The virus was transmitted by sap inoculation to eggplant, *Solanum nodiflorum*, *Nicotiana glutinosa*, *N. rustica*, tobacco, *Physalis peruviana*, chilli (*Capsicum frutescens*), petunia, *Nicandra physaloides*, and tomato. The Japanese Long and New York Improved eggplant varieties were shown in repeated tests to be symptomless but locally infected. *P. peruviana* displayed no local lesions, such as those detected on *P. floridana* [28, p. 237], at a temperature range of 12° to 29°, but developed marked systemic symptoms. The immunity of pineapple, *Emilia sonchifolia*, and *Datura stramonium* var. *chalybea* was demonstrated. Transmission to *Nicotiana rustica* was readily effected by *Myzus persicae* after a one- to two-day acquisition and a three- to four-day infection feeding of 5 to 15 apterous young aphids per plant.

Natural infection of tomato [33, p. 11] and chilli by virus Y was observed in a truck-farming district on the island of Oahu, where the highly susceptible weed host *S. nodiflorum* is very prevalent all the year round, showing extremely faint or scarcely perceptible symptoms. It is probably a major reservoir of the virus under natural conditions.

Virus Y must have been introduced into Hawaii in tubers, perhaps many years before its discovery, since potatoes have been continuously imported from the Pacific Coast States during the last 100 years, mostly for food but also for planting.

McKay (R.) & Loughnane (J. B.). **Effects of some single viruses and of combinations of the same viruses on three Potato varieties.**—*Sci. Proc. R. Dublin Soc.*, N.S., 26, 7, pp. 133–143, 2 pl., 1953.

In studies at the Department of Plant Pathology, University College, Dublin, the effects on Arran Banner, Majestic, and President potato plants of two strains of virus X [*R.A.M.*, 28, p. 637], Xc (very mild) and Xd, and one of virus A, alone and in combination were determined. Xc, carried symptomlessly in all three varieties, did not reduce yield; Xd caused insignificant reduction of yield in Arran Banner and none in Majestic, where it was carried as latent mosaic, though in President it caused foliage mottling and reduced the yield by over 11 per cent. Virus A reduced yields in Arran Banner and President by approximately 15 and 16 per cent., respectively; it was carried symptomlessly without yield reduction by Majestic.

Crinkle (Xc plus A) [cf. above, p. 107] reduced the yields of Arran Banner and President by 17 and 30 per cent., respectively. It produced a conspicuous mosaic on Majestic foliage, but appeared to have only a negligible effect on yield. Crinkle produced by Xd plus A caused mottling, puckering, and reduction in leaflet size and in mean leaf length by two to three inches, with corresponding reductions in yield of 46, 29, and 55 per cent., respectively, in Arran Banner, Majestic, and President.

Kerssen (M. C.). **Observations on Potato-late-blight control by airplane and atomiser.**—*OnderzVersl. Inst. plziektk. Onderz., Wageningen*, 1, 12 pp., 4 diags., 5 graphs, 1952. [Multilithed.]

In addition to information already presented from another source on the control of potato blight (*Phytophthora infestans*) by aeroplane and mist blower spraying in Holland [*R.A.M.*, 32, p. 275], this account of the experiments contains data on the respective droplet sizes of the fungicides used.

The maximum amount of liquid that could be applied by the aeroplane flying at 80 m.p.h. was 47 l. per ha. For the control of potato blight it is necessary to apply 100 to 200 l. per ha. when a ground atomizer is used and consequently very high concentrations had to be applied by aeroplane. Copper Sandoz (cuprous oxide) can be used without difficulty at a strength of 4 to 6 kg. per 40 l. water, koneprox and copper Bayer (copper oxychloride) at 11 kg., and zineb (dithane Z-78) at 3 to 5 kg. Koneprox at the highest concentration used in field experiments (11 kg. per 47 l.) gave the largest droplets; those of copper Sandoz and zineb were smaller. Zineb left the smallest residual droplets in mist blower tests. The results show that it should be possible by aeroplane spraying to protect the crop against potato blight.

Richter (H.) & Schneider (R.). **Untersuchungen zur morphologischen und biologischen Differenzierung von Rhizoctonia solani K.** [Studies on the morphological and biological differentiation of *Rhizoctonia solani* K.]—*Phytopath. Z.*, 20, 2, pp. 167–226, 18 figs., 4 diags., 1 graph, 1953.

Continuing their studies on *Rhizoctonia* [*Corticium*] *solani* at the Biological Institute, Berlin-Dahlem [*R.A.M.*, 32, p. 209], the authors divided into six groups,

according to their ability to form hyphal anastomoses [cf. 17, p. 183], 176 strains from 45 hosts in 24 families originating in various parts of Germany and other European countries, North and South America, Australia, and Asia. There were also six morphological groups which paralleled the fusion groups, except for a few aberrant strains in group B. The characters which appeared to be common to a particular group were the width of the hyphae; colour and zoning of the submerged mycelium; colour, abundance, and texture of the aerial mycelium; and colour and production of pseudosclerotia. The 21 crucifer and 80 potato strains fell into two groups (D and F, respectively), which formed anastomoses almost exclusively with members of their own group and differed markedly from the other four in their temperature relations. Thus, the minima for A, B, C, and E ranged from 5·2° to 10° C., the optima from 25° to 29°, and the maxima from 33° to 38°, while the corresponding levels for D were 1·4° to 5·2°, 21° to 25°, and 31° to 33°, and for F 0° to 1·4°, 21° to 25°, and 29° to 33° [cf. 2, p. 471; 4, p. 519; 22, p. 86; 24, p. 470]. The potato group had the slowest growth rate. A correlation was observed between the temperature relations of the different strains and the climatic conditions in their prevailing native habitats, as well as (within certain limits) the requirements of the host in this respect [cf. 4, p. 444].

Group F strains caused very little infection of hosts other than potato. Outside the potato group there was no evidence of physiologic specialization [cf. 32, p. 277], though a 'predilection' for a particular host was exhibited by some strains, notably those from crucifers. Damage to potato sprouts was caused principally by strains of the potato group, but 29 from other groups induced atypical symptoms, five crucifer isolates being highly pathogenic. Quantitative differences in 'aggressiveness' were observed within the potato group, the weakly pathogenic strains growing poorly on raw potato tuber tissue, but none gave absolutely negative results in inoculation experiments.

Нковвиін (N. D.). Серебристая парша клубней Картофеля. [Silver scurf of Potato tubers.]—Бот. Журн. [*J. Bot. U.S.S.R.* = *Bot. Zh. S.S.S.R.*], 38, 2, pp. 206–214, 2 col. pl., 1953.

This paper on *Spondylocladium atrovirens* [C.M.I. map No. 233] deals with the history, identification, nomenclature, and symptoms of the disease, which together with *Colletotrichum atramentarium* [No. 190: *R.A.M.*, 32, p. 692] seriously impedes potato cultivation in the U.S.S.R. Both fungi usually attack a plant simultaneously, the latter normally occurring on the stem but sometimes on the tubers too. In trials for resistance to *S. atrovirens* Parnassia and Epicure × Boyatsense remained resistant even after six months' storage. The disease apparently develops in storage and is somewhat more severe on tubers from peat soils than on those from podsols. Infection percentage and intensity were found to be greater (the former almost double) in tubers stored in the laboratory at 60 to 70 per cent. air humidity and 15° to 16° [C.] than in those from storage rooms at 84 to 87 per cent. air humidity and 0° to 5°.

For the control of the disease infected tubers should be rejected at all stages. If incidence is slight, potatoes should be tested in the spring by placing them for 12 to 15 days under conditions favourable to disease development, i.e., 23° to 25° and 90 to 95 per cent. air humidity. The appearance of conidia indicates silver scurf infection. Tubers should be left to dry in the field for three or four hours after digging or dried indoors for five to seven days. Burning the dying potato leaves would prevent infection by *C. atramentarium*. Strict observance of crop rotation, allowing a lapse of at least three to four years before the next potato crop, and the development of resistant varieties and hybrids are recommended.

A preliminary note is given on potato 'black skin' disease which is very widespread in northern U.S.S.R. The disease, the cause of which is unknown, occurs in

storage in January and develops more intensively during April and May. So far, isolation experiments have yielded *S. atrovirens*, *Oospora pustulans*, *C. atramentarium*, pycnidia resembling those of *Phoma*, and a *Rhizoctonia* species. A close relationship is observed between the occurrence of a particular fungus on the tubers and the soil type in which they are grown. Thus, *S. atrovirens* predominates on potatoes from peat bog soil, and *O. pustulans* on those from iron podsol.

Endo (S.) & Takatu (S.). **Studies on the black-spot disease of Sweet Potato. V. Influence of Fusarium sp. and Colletotrichum sp. isolated from the diseased regions of black-spot disease of Sweet Potato caused by Macrosporium bataticola Ikata, on the occurrence of black spot disease and its symptoms.**—*Forsch. PflKr., Kyoto*, 4, pp. 189–191, 1951. [Japanese, with English summary. Received 1952.]

A *Fusarium* sp. and a *Colletotrichum* sp. isolated from diseased parts of sweet potatoes in Japan suffering from black spot disease (*Macrosporium bataticola*) [*R.A.M.*, 33, p. 103] were shown to be non-pathogenic. The diseased spots formed by mixed inoculation with these three fungi were similar to natural infections and smaller than those produced by *M. bataticola* alone. The *Fusarium* sp. and *Colletotrichum* sp. are antagonistic to *M. bataticola* and reduce the severity of the disease.

Goto (K.) & Tagami (Y.). **Varietal susceptibility of Sweet Potatoes to black rot and its mechanism. I. Factors influencing the infection of roots in the field and their interrelation.**—*Ann. phytopath. Soc. Japan*, 17, 1, pp. 16–20, 2 graphs, 1953. [Japanese, with English summary.]

Studies were made from 1951 onwards at Shiraimura, Chiba Prefecture, Japan, on the factors determining the severity of black rot of sweet potatoes [*Ceratocystis fimbriata*: *R.A.M.*, 31, p. 294] in the field and the mechanism of infection based on the reaction of 53 varieties [32, p. 693]. The roots become infected mostly from the diseased base of the seedling, soil infection being of minor importance. Varietal differences in the field were apparent in the degree of enlargement of the underground stem lesions and eventually in the infection ratio at digging time, presumably because the density of the pathogen was reduced round resistant plants partly owing to the rapid healing of stem lesions during the summer. An even more important factor is the susceptibility of the roots to attack by wireworms (*Melanotus caudex*) which transmit the disease. The above criteria are subject to modification annually by reason of climatic factors. Similar conditions prevail throughout the regions of Kanto and Tokai and presumably in other parts of southern and western Japan also.

Feazell (G. D.). **Reaction of Sweet Potato varieties and seedlings to internal cork disease.**—Abs. in *Phytopathology*, 43, 5, p. 290, 1953.

In tests on sweet potato varieties and seedlings [? at the Louisiana Agricultural Experiment Station] for the determination of reaction to internal cork [virus: *R.A.M.*, 33, p. 48], slips from mother potatoes core-grafted with diseased Porto Rico plants were set in the field and crops harvested from them. Some of the roots were examined on lifting and others after seven months' storage at 70° to 80° F. The varietal ratings were as follows: susceptible, Porto Rico Unit 1, Queen Mary, and Goldrush; intermediate, Heartgold; resistant, Allgold [32, p. 504] and Pelican Processor. The following grades were assigned to the Louisiana seedlings that appeared promising for development: susceptible, 9–47; intermediate L-240, 9–2, 9–39, and 9–49; resistant, 9–18, 9–65, 9–65A, and L224. When cores taken from cork-free roots of Heartgold and Allgold were grafted into healthy Porto Rico roots, the latter contracted severe internal cork infection, indicating that the virus may be present in a symptomless form even after seven months in storage [cf. 32, p. 276].

PADMANABHAN (S. Y.). **Effect of nitrogenous fertilization on the incidence of 'blast' on Rice varieties.**—*Curr. Sci.*, 22, 9, pp. 271–272, 1953.

The seedling reaction of nine rice varieties to foliar infection with a spore suspension of *Piricularia oryzae* [*R.A.M.*, 32, p. 472, and next abstract] with different levels of nitrogenous fertilizer [cf. 32, p. 210] was investigated in pot studies at the Central Rice Research Institute, Cuttack, India. Leaf infection varied significantly between the varieties tested as the strength of ammonium nitrate solution applied was increased, ranging from practically no increase in infection over the six levels (equivalent to 0 to 100 lb. nitrogen per acre) in Co. 4 and rising steeply in Co. 13 with each increase in level up to 80 lb. It is suggested that for general purposes resistance tests in India should be carried out using 40 lb. nitrogen per acre, but for selecting highly resistant parents for hybridization the 100 lb. rate is advisable.

SUZUKI (H.). **Studies on the relation between the susceptibility of Rice plant to blast disease caused by low soil temperature and its anatomical and physiological characters.**—*Forsch. PflKr., Kyoto*, 4, pp. 46–54, 1951. [Received 1952.]

The anatomical characters of rice plants susceptible to blast [*Piricularia oryzae*: see preceding and next abstracts] have already been noticed from another source [*R.A.M.*, 31, p. 204]. The physiological character investigated in this paper was the potassium-ammonium ratio in the epidermal cells [cf. 32, p. 276]. This ratio was lower in soil at a low temperature and lower in susceptible plants, a low level allowing entrance and infection by the fungus, because of the retardation in development of anatomical features which appear to inhibit it. There was no difference between susceptible and resistant varieties of rice at low temperatures [32, p. 643].

WATANABE (T.). **Studies on the vaccine therapy of the blast disease of Rice plants. 6. The effect of various vaccines of Rice blast fungus to the development of the Rice plant and of the causal fungus.**—*Forsch. PflKr., Kyoto*, 4, pp. 55–63, 1951. [Japanese with English summary. Received 1952.]

In work at Utsunomiya University, Japan, vaccines [cf. *R.A.M.*, 14, p. 385; 15, p. 389; 28, p. 193] of the rice blast fungus (*Piricularia oryzae*) [see preceding and next abstracts] checked the germination of rice seed and at first retarded the growth of the seedlings; later growth was promoted and the increase in height and amount of branching of the stems was in inverse proportion to the concentration of vaccine. The yields of rice plants treated with filtered vaccine, 1 in 5 diluted living vaccine, or 0·7 per cent. solution of dry vaccine surpassed the control. The other vaccines had no effect on yield. Plants treated with vaccines, particularly the dry and the filtered, were less susceptible to *P. oryzae*. These results seem to show the presence of toxin-like substances in the vaccine which may be produced by the metabolism of the causal fungus itself.

ONO (K.). **Effect of other pathogenic fungi to the sclerotium formation of Helminthosporium sigmoideum var. irregulare and Hypochnus sasakii.**—*Forsch. PflKr., Kyoto*, 4, pp. 81–84, 1951. [Japanese, with English summary. Received 1952.]

An investigation was made into the effect of fungi causing various rice diseases in Japan on sclerotial formation by *Hypochnus* [*Corticium*] *sasakii* [*R.A.M.*, 32, p. 505] and *Helminthosporium sigmoideum* var. *irregulare* [loc. cit.]. Their own staled culture solutions and that of *Piricularia oryzae* [see preceding abstracts] had no effect, but *Ophiobolus miyabeanus* [32, p. 695, and next abstracts] seemed to promote sclerotial formation of *H. sigmoideum* var. *irregulare*. Sclerotium formation of both test fungi was suppressed by non-sterilized staled culture solutions of *Gibberella fujikuroi* [30, p. 342], but was promoted when the solution was sterilized.

Mizukami (T.). **On the Helminthosporium disease resistance of Rice seedlings treated with ether vapour. II. The effects of the ether treatment upon the growth of Rice seedlings and of Ophiobolus miyabeanus Ito et Kuribayashi. III. On the depression of transpiration rate and Helminthosporium disease resistance of Rice seedlings treated with ether vapour. IV. On the relation of the permeability of Rice leaf and the development of the affected part. V. Patho-histologic observations on Rice leaf with respect to the development of lesion of this disease.**—*Sci. Bull. Fac. Agric. Kyushu Univ.*, 12, 3, pp. 177–180, 181–184; 4, pp. 299–303, 305–308, 7 figs., 3 graphs, 1952. [Japanese, with English summaries. Received 1953.]

In further work at the Faculty of Agriculture, Kyushu University, Japan [cf. *R.A.M.*, 31, p. 294], the growth of rice seedlings was retarded for one day, and that of *Ophiobolus miyabeanus* [see preceding and next abstracts] for two days, after treatment with ether vapour for 24 hours. Similar treatment decreased the transpiration rate of the seedlings for three days, and their resistance to infection by *O. miyabeanus* for two. The permeability of the tissue surrounding a lesion was lower than that of the other healthy parts [cf. 18, p. 812], and that of treated leaves was decreased compared with the untreated.

A typical lesion enlarged to a peculiar ring spot in a few days after application of the vapour. Mycelial invasion was a more important factor in lesion formation than any toxic effect of the parasite.

Akai (S.). **On the cellulase activity in the mycelium of Cochliobolus (Ophiobolus) miyabeanus.**—*Forsch. PflKr., Kyoto*, 4, pp. 64–70, 1951. [Japanese, with English summary. Received 1952.]

In this investigation of the cellulase activity of *Ophiobolus miyabeanus* [see preceding abstracts] grown in modified Richards's solution (0·5 per cent. sucrose) it was found that the optimum pH for enzyme activity was approximately 5·5 to 6, and the optimum temperature 35° C. Up to 11 days in culture the activity of the enzyme was greater at 28° than at 20° or 32°, but after 20 days it was greater at 20° than at 28°.

Mizuta (H.). **Studies on the culture of Bacterium oryzae (Uyeda et Ishiyama) Nakata. (Preliminary report.)**—*Ann. phytopath. Soc. Japan*, 17, 2, pp. 73–75, 1953. [Japanese, with English summary.]

Bacterium [*Xanthomonas*] *oryzae* [*R.A.M.*, 32, p. 506] grew best on bouillon-glucose and potato-sucrose agars at pH 4 to 8·8. Growth was also satisfactory with maltose as the sugar.

Hoedt (T. G. E.). **Opmerkingen over Hevea-selectie in Z. O.-Azië en Latijns Amerika in verband met het optreden van Dothidella ulei.** [Observations on *Hevea* selection in south-east Asia and Latin America in connexion with the occurrence of *Dothidella ulei*.]—*Arch. Rubbercult.*, 30, 1, pp. 1–37, 3 figs., 1953. [English summary.]

This is an exhaustive survey and discussion of the existing situation with regard to South American leaf blight (*Dothidella ulei*) of *Hevea* rubber, the risks attending its possible introduction into Africa and south-east Asia [*R.A.M.*, 32, p. 588], and breeding for resistance to the pathogen.

On a recent visit to Brazil the author learnt that the genetic factor for resistance to *D. ulei* may be present to some extent in the progeny of the Wickham seeds which have been used in all the rubber plantings of south-east Asia. In an experiment at Belém (Pará), for instance, a Sumatra clone (Avros 1301) was highly resistant. A particularly urgent aspect of the whole problem is the study of the fundamental reason for the resistance of different *Hevea* species and clones. In the interests of

rubber cultivation in both hemispheres the establishment of an international supervisory organization is proposed for the promotion of co-operation between all the scientific institutes engaged in the work of selection.

LOBB (W. R.). **Molybdenum investigations in north Otago. Progress of molybdenum investigations in north Otago.**—*N.Z. J. Agric.*, 84, 5, pp. 356–357, 5 figs., 1952; 87, 1, pp. 3–5, 7, 9, 11, 12 figs., 1953.

Investigations started in 1951 showed that molybdenum deficiency [cf. *R.A.M.*, 32, pp. 531, 563, 600] is widespread in the north of Otago, New Zealand, where responses to molybdenum dressings were obtained on the range of soils covering a large part of the area. Trials were confined mainly to pasture crops, rape, and lucerne. Responses were generally recorded in pastures where rapid failure followed satisfactory establishment in the first year. The recommended rate of application of $2\frac{1}{2}$ oz. of 97 per cent. sodium molybdate per acre appears to be excessive.

In the second paper the results are given of further investigations into the problem, including the response to molybdenum treatment of various soil types and crops, including wheat, oats, and some vegetables, and the recommended rate, time, and methods of application.

JEFFERYS (E. G.) & HEMMING (H. G.). **Fungistasis in soils.**—*Nature, Lond.*, 172, 4384, pp. 872–873, 1953.

The presence of fungistasis in soils [*R.A.M.*, 32, p. 643] was demonstrated in experiments at the Butterwick Research Laboratories, Welwyn, Herts., by assaying with spores of *Botrytis allii* (1) soil water displaced from several soils with alcohol, (2) the ether-extracted residue from activated charcoal buried in cellophane bags at various locations and depths at Wareham Heath [Dorset: 32, p. 441], and (3) slabs of water agar placed in intimate contact with the face of sloping soil profiles. Growth was retarded or inhibited in all cases. The results suggested discontinuous 'islands' rather than a widespread 'sea' of inhibition.

GRÜMMER (G.). **Die Wirkung von Alternaria-Infektionen an Mohnkapseln auf die Keimungsbereitschaft ihrer Samen.** [The influence of *Alternaria* infections of Poppy capsules on promptitude of germination by their seeds.]—*Flora, Jena*, 140, 2, pp. 298–306, 5 graphs, 1953.

The typical infection symptom of opium poppy (*Papaver somniferum*) by *Alternaria brassicae* var. *somniferum* [*R.A.M.*, 25, p. 418], i.e., precocious germination of the unripe to semi-ripe seeds within the capsules, is attributed on the basis of studies on inoculated field plants at the University of Greifswald, Germany, to the secretion by the fungus of metabolic products which stimulate germination.

MEHROTRA (B. S.). **Fusarium roseum Link and Sclerotium rolfsii Sacc. on Ginger rhizomes.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 52–53, 2 figs., 1953.

In August, 1951, stored ginger rhizomes at Allahabad, India, were covered by a white aerial mycelium resembling in all respects that of *Fusarium 'roseum'* [*R.A.M.*, 17, p. 732] except in the size and septation of the conidia (mostly 5-septate and measuring 30 to 50 by 3·5 to 4 μ). Inoculation experiments suggested that the fungus is a secondary or wound parasite. In August, 1952, rhizomes in a local market bore patches of mycelium of *Sclerotium rolfsii* [cf. 16, p. 835], a new host record for India.

YAMAMOTO (M.). **Bacterial leaf spot of Jimson Weed, with special reference to the resistance of the causal organism to various chemicals.**—*Forsch. PflKr., Kyoto*, 4, pp. 160–168, 1951. [Received 1952.]

Bacterial leaf spot of Jimson weed (*Datura* spp.) occurs from summer to autumn

in the Saitama Prefecture, Japan, and is characterized by transparent, white or pale brown spots, frequently with a dark brown margin. The causal bacterium is *Phytomonas hemmianas* n.sp. In inoculation experiments the bacterium infected *D. metel*, *D. meteloides*, *D. inermis*, tomato, and petunia. The bacterium measures 1·3 to 2·2 by 0·3 to 0·7 μ and is characterized by its ability to produce indole, ammonia, and hydrogen sulphide, nitrite from nitrate, acid and gas from sucrose, and to turn milk acid. It exerts a strong diastatic action on starch and liquefies gelatin. The colonies are white to pale yellowish.

Diseases.—*Rep. Hawaiian Sug. Exp. Sta., 1952*, pp. 24–28, 4 figs., [? 1952.]

In this report [cf. *R.A.M.*, 32, p. 101] it is stated that since the agreement in 1951 between the Colonial Sugar Refining Co., Ltd., and the Hawaiian Sugar Planters' Association that further testing of Hawaiian sugar-cane varieties for disease resistance should be carried out in Fiji, the Samoan substation was officially closed on 1st February, 1952.

Among the sugar-cane diseases observed by J. P. Martin during a visit to Peru [32, p. 339] were cluster stool, ratoon chlorosis, sooty mould [unspecified: cf. 18, p. 56], red rot of the leaf sheath [*Sclerotium rolfsii*: cf. 32, p. 214], and sugar-cane mosaic virus [cf. 32, pp. 212, 645].

Of the 36 fungicides tested for the control of *Pythium* root rot of sugar-cane seedlings [*Pythium* spp.: 32, p. 101], only copper-8-hydroxyquinolinolate was better than the standard fungicide, phygon.

Cuttings of the variety 47–4991 from severely stunted plants from a growth failure area at Waipio, treated with phenyl mercuric acetate and planted in the same locality, developed after a few months symptoms of the disorder, the cause of which is unknown.

Abbott (E. V.). **Evidence for the occurrence of a hitherto unrecognized growth-retarding disease of Sugarcane in Louisiana.**—Abs. in *Phytopathology*, 43, 5, p. 289, 1953.

In general, the symptoms exhibited by sugar-cane plants suffering from the frequent prolonged droughts which have occurred of recent years in Louisiana resemble those of ratoon stunting virus disease in Australia [*R.A.M.*, 33, p. 51], and include growth retardation, deficient root system, and reduction in stalk number and diameter, often accompanied by pallor of the leaves and an orange-yellow discoloration of the vascular bundles at the nodes. The inoculation of healthy stem cuttings in October, 1951, with sap from stunted plants of two varieties was followed during the next year by a substantial reduction in growth and weight, as well as other symptoms observed in naturally infected crops.

Farrar (L. L.). **Johnson Grass as a possible wild host of Sclerospora disease of Sugarcane.**—*Plant Dis. Reptr*, 37, 8, p. 446, 1953. [Multilithed.]

In July, 1953, a witches' broom effect was observed on Johnson grass (*Sorghum halepense*) growing near sugar-cane infected with a species of *Sclerospora* (*S.* ? *macrospora*) [*R.A.M.*, 33, p. 51] in Louisiana [cf. 32, p. 278]. The oospores found in diseased leaves were indistinguishable from those in sugar-cane, indicating that Johnson grass may be susceptible to the sugar-cane disease.

Rogers (D. P.). **Disposition of Nomina Generica Conservanda Proposita for fungi.**—*Mycologia*, 45, 2, pp. 312–322, 1953.

The disposition is given of the numerous generic names of fungi proposed for conservation up to 1st July, 1950, after consideration by the special committee for fungi. Thirteen names were conserved at Stockholm in 1950; these are given in the

new Code of Nomenclature and include *Clavaria*, *Daldinia*, *Marasmius*, *Stagonospora*, and *Uromyces*. By a written vote 16 additional names, including *Candida*, *Coniothyrium*, *Phoma* Sacc., and *Urocystis*, were adopted for conservation.

Fischer (G. W.) & Shaw (C. G.). **A proposed species concept in the smut fungi, with application to North American species.**—*Phytopathology*, 43, 4, pp. 181–188, 1953.

The advances of the past century in genetics, ecology, physiology, and morphology, have introduced changes in the original principles of botanical taxonomy which are reflected, for instance, in the species concept in the Ustilaginales [*R.A.M.*, 17, p. 45; 23, p. 170; 24, p. 474; 30, p. 432]. The species concept herein proposed for the smut fungi is based primarily on a practical degree of morphology, but attention is also paid to host specialization at the host family level. Thus, any two or more smuts of similar morphology and symptomatology, parasitizing different species and genera of the same host family, would be regarded as belonging to one morphological species. On the other hand, smuts of comparable morphology attacking members of different host families would be deemed distinct species.

Applying this concept to the North American Ustilaginales, the author proposes 29 consolidations, reducing to synonymy about 46 species generally considered distinct. The legitimate binomial is given for each, together with the more important synonyms. Some of the suggested consolidations will apply unfamiliar binomials to well-known smuts, e.g., *Urocystis colchici* for onion smut, *U. agropyri* for flag smut of wheat, *Ustilago avenae* for black loose smut of barley, and *U. hordei* for covered smut of oats, which may appear illogical at first sight, but similar examples abound in mycological literature, so that this objection may be disregarded.

The question of nomenclature for taxonomic ranks lower than species is discussed. It is recommended that the recognition of specialized varieties, designated by trinomials, within collective morphological species, based on host specialization (at the genus level) [cf. 32, p. 281] should be extended to the smuts. Physiologic races within these varieties would be referred to by number. Examples are given of the application of this system to *U. striiformis* [19, p. 351] and *U. nuda*. The former has several varieties already which may be designated *U. s. agrostidis* on *Agrostis*, *U. s. phlei* on *Phleum*, and so on.

Thirumalachar (M. J.), Pavgi (M. S.), & Mishra (J. N.). **Additional hosts for charcoal rot of plants in India.**—*Plant Dis. Reptr*, 37, 7, pp. 408–409, 1953. [Multilithed.]

This annotated list of additional hosts for *Macrophomina phaseoli* in India [*R.A.M.*, 32, pp. 176, 544] includes garlic [cf. 24, p. 350]; *Eleusine coracana*, infection causing foot rot and hollow stem; radish (charcoal rot); and *Solanum nigrum* (root rot).

De Vries (G. A.). **Contribution to the knowledge of the genus Cladosporium Link ex Fr.**—Thesis, University of Utrecht, xvi+121 pp., 19 figs., 3 graphs, 1952. [Dutch summary.]

This is a comprehensive study of the morphology, taxonomy, and some biological and biochemical characters of the genus *Cladosporium*, based on exsiccata and monospore cultures on a variety of media, among which a glucose agar containing mineral salts was selected as the standard.

An amended diagnosis of the genus involves the relegation to synonymy of *Heterosporium* and *Hormodendrum*. *C. herbarum* is the type species. Full descriptions of 12 species and four forms and a key to 11 of the species are given. One new

species, four new forms, and several new combinations are made. *C. variabile* n.comb. (syn. *Heterosporium variabile* [*R.A.M.*, 22, p. 179] and *Helminthosporium variabile*), isolated from spinach affected by yellow leaf spot [32, p. 234] at Baarn, comprised two forms, one of which produced fairly long conidiophores with distinct prolongations and two to four rather short chains of dark, verrucose, uni- to multicellular conidia, 9 to 16 by 6·5 to 7 μ, while the other was characterized by short conidiophores with two or more long chains of oval, light brown, smoother, unicellular conidia, 5 to 9 by 4 to 6 μ.

C. cladosporioides n.comb. is regarded as a separate species and not merely a form of *C. herbarum*, from which it differs in its smaller, usually unicellular, smooth conidia, the larger number of conidia per head, the more profuse branching of the conidial chains, and the absence of prolongations and inflations of the conidiophores. *C. pisicola* [14, p. 71] is regarded as a form of this species.

Pullularia werneckii n.comb. is the name assigned to *C. wernecki*, the agent of a skin disease of man in Brazil [20, p. 203]. *C. paeoniae* and *C. vignae*, pathogenic to peony [19, p. 541 *et passim*] and cowpea [21, p. 238], respectively, are retained as distinct species, though the latter may prove to be only a forma of *C. cladosporioides* when more material is available for study.

When some strains of *C. fulvum* were cultured on lupin stems they gave rise to black, pseudoparenchymatous pycnidia, probably of the *Asteromella* type, producing in abundance small, smooth, cylindrical, hyaline pycnidiospores, measuring 2·5 to 4·5 by 1 to 1·5 μ.

The symptoms induced by *C. cucumerinum* on cucumber [26, p. 375; 31, p. 479] and by *C. cladosporioides* f.sp. *pisicola* on peas were used as taxonomic characters.

The growth and germination of all the strains of *Cladosporium* tested were markedly inhibited by one to two weeks' association in Petri dishes with germinating spinach seeds. Violet or purple exo-pigments, soluble in tributyrine, are common in *Cladosporium* cultures. All the species except *C. avellaneum* n.sp. rapidly liquefied gelatin.

Monospore cultures of *C. herbarum*, *C. cladosporioides*, and *C. sphaerospermum* grown on detached leaves of *Euonymus alata*, *Nerium oleander*, *Phragmites communis*, and pine (*Pinus* [*heldreichii* var.] *leucodermis*) demonstrated that the shape of the sori is dependent on the anatomical structure of the host tissues.

Baxter (J. W.). **South American species of Puccinia on Salvia.**—*Mycologia*, 45, 1, pp. 115–135, 2 pl., 1953.

In this monograph of the species of *Puccinia* known to occur on *Salvia* in South America [cf. *R.A.M.*, 31, p. 578], 11 species are redescribed and redefined, while two are described as new.

Batista (A. C.). **Um pugilo de novos fungos imperfeitos.** [A handful of new fungi imperfecti.]—*Bol. Sec. Agric. Pernambuco*, 19, 1–2, pp. 143–150, 7 figs., 1952.

Included in this annotated list of nine new species of fungi imperfecti collected in Pernambuco, Brazil, is *Phoma corchororum* on living branches of jute (*Corchorus capsularis*). The pycnidia are 150 to 200 μ in diameter and the spores 17·5 to 22·5 by 6 to 9 μ.

Batista (A. C.) & Vital (A. F.). **Monografia das espécies de Phyllosticta em Pernambuco.** [Monograph of the species of *Phyllosticta* in Pernambuco.]—*Bol. Sec. Agric. Pernambuco*, 19, 1–2, pp. 1–80, 12 figs., 1952.

Of the 115 species of *Phyllosticta* in this annotated list from Pernambuco, Brazil [cf. *R.A.M.*, 32, p. 698], 46 are considered to be new to science, including *P. anacardicola* on *Anacardium occidentale*, *P. castanieiperda* on sweet chestnut,

P. cinnamomo-zeylanici on cinnamon, *P. cymbopogoni* on *Cymbopogon nardus*, *P. gladioli-minoris* on *Gladiolus cardinalis*, *P. jasminensis* on *Jasminum grandiflorum*, *P. moquileae*, *P. moquileorum*, and *P. passifloramaculans* on passion fruit, *P. persearum* on avocado, *P. puerariae* on *Pueraria thunbergiana*, and *Phyllosticta sacchari-majoris* on sugar-cane.

Among the other records may be mentioned *P. adusta* on citrus [cf. 10, p. 554], *P. agaves* on sisal, *P. bataticola* on sweet potato, *P. brassicicola* [28, p. 422] on radish, *P. cajani* [17, p. 56] on pigeon pea, *P. canavaliae* on *Canavalia ensiformis*, *P. capsici* on chilli, *P. caricae-papayae* on papaw [28, p. 489], *P. chrysanthemi* on *Chrysanthemum leucanthemum*, *P. coffeicola* on coffee [9, p. 177], *P. colocasicola* on *Colocasia esculenta*, *P. cucurbitacearum* [28, p. 510] on squash and *Luffa* sp., *P. dahliicola* on dahlia [30, p. 161], *P. dianthi* on carnation, *P. dolichi* on *Dolichos lablab*, *P. gossypina* on cotton [28, p. 31], *P. hibiscina* on *Hibiscus esculentus*, *P. lantanae-verae* on *Lantana camara*, *P. morifolia* on mulberry [17, p. 71], *P. musae-sapientii* on dry leaves of banana [cf. 7, p. 731], *P. palmicola* on coco-nut, *P. phaseolina* [9, p. 274; 31, p. 458] and *P. phaseolorum* [13, p. 804] on cowpea, the former also on bean [*Phaseolus vulgaris*], *Phyllosticta ricini* on *Ricinus communis*, *P. sacchari* on sugar-cane [14, p. 57; 22, p. 198], *P. sorghina* on *Sorghum halepense* [14, p. 57], and *P. theobromae* on cacao [13, p. 184].

Karling (J. S.). **Micromyces and Synchytrium.**—*Mycologia*, 45, 2, pp. 276–287, 1953.

The author, after a brief historical review of the studies that have appeared on *Micromyces*, states that there are now no valid reasons for retaining it as a separate genus, and transfers the species to *Synchytrium* [see next abstract]. As they do not fit into any of the known subgenera, a new one, *Microsynchytrium*, is proposed to include them. A subgenus, *Exosynchytrium*, is proposed for *S. fulgens* [*R.A.M.*, 9, p. 542] and other species with the same life-cycle and type of development. This subgenus is placed near *Eusynchytrium*.

A key is given to the seven subgenera (including *Woroninella*) based on the presence or absence of summer sporangial sori (or prosori) and resting spores, the type of resting-spore germination, and the development of the mature vegetative thallus into a sorus or its function as a prosorus. *S. endobioticum* is placed in the subgenus *Mesochytrium*. A list of 54 references is appended.

Lingappa (B. T.). **Some new species of Synchytrium from Banaras.**—*Mycologia*, 45, 2, pp. 288–295, 1 pl., 1953.

Descriptions are given of three new species of *Synchytrium* [see preceding and next abstracts], including *S. akshaiberi* n.sp. on eggplant. This fungus forms galls 90 to 250 μ, later 0·8 to 1·5 mm., in diameter over the leaf surfaces, petioles and stems, becoming cupulate and coalescing to form irregular yellow, later brown thickenings. The yellow sporangia, 30 to 40 in number, are 16 to 18 μ in diameter. The dark brown, spherical, rarely oval hypnospores, one or more in a gall, each inside a single host cell, measure 48 to 130 (average 92) μ in diameter. The exospore is 6 to 9 μ thick. The fungus attacked nursery seedlings in 1950 and 1951 and spread rapidly.

Cook (M. T.). **Species of Synchytrium in Louisiana VIII. New species.**—*Mycologia*, 45, 1, pp. 101–114, 4 pl., 1953.

In continuation of this series [cf. *R.A.M.*, 30, p. 491; *Mycologia*, 44, pp. 827–828, 1952] the author gives descriptions (with special details of the galls) of 21 new species of *Synchytrium* [*R.A.M.*, 32, p. 401, and preceding abstracts] found in Louisiana, including *S. parthenocissi* n.sp. on *Parthenocissus quinquefolia*, *S.*

liquidambaris n.sp. on *Liquidambar styraciflua*, and *S. tecomae* n.sp. on *Tecoma radicans*. The first develops a primary fungal mass 15 to 248 μ in diameter, the second 73 to 300 μ, and the third 150 by 450 μ. No sporangia were seen.

CLAYTON (E. E.). **Control of Tobacco diseases through resistance.**—*Phytopathology*, 43, 5, pp. 239–244, 3 figs., 1953.

From extensive personal experience at the Plant Industry Station, Beltsville, Maryland, and a study of 11 contributions to the literature, the author describes as follows, in a paper presented at the Symposium on Disease Resistance at the 44th Annual Meeting of the American Phytopathological Society at Ithaca, New York, on 8th September, 1952, the current situation in respect of tobacco disease control through breeding for resistance. Sources of resistance to the major diseases are available in *Nicotiana tabacum*, but so far it has proved impracticable to utilize even half this material in the development of commercial varieties, the non-usable portion having been consistently defective in plant type, yield, or quality. Except for its reaction to Ambalema mosaic virus [*R.A.M.*, 20, p. 601], the inheritance of resistance obtained within *N. tabacum* is polygenic. Notwithstanding those handicaps an entire series of valuable commercial varieties has been produced, carrying different degrees of resistance [31, p. 212 *et passim*] to black root rot (*Thielaviopsis basicola*), black shank (*Phytophthora parasitica* var. *nicotianae*) [see next abstract], bacterial wilt (*Pseudomonas solanacearum*) [33, p. 54], and *Fusarium* wilt (*F. oxysporum* var. *nicotianae*) [30, p. 201].

Immunity from or very high resistance to the principal diseases of the crop has further been found in various wild species of *Nicotiana*, including *N. glutinosa*, *N. longiflora*, *N. debneyi*, *N. plumbaginifolia*, and *N. megalosiphon*. Transfers to tobacco of simple monogenic dominant immunity from mosaic [17, p. 417; 32, p. 282] and wildfire (*P. tabacum*) [26, p. 358] have already been accomplished, while great progress has been made in the incorporation of root rot immunity and the resistance to blue mould (*Peronospora tabacina*) carried by *N. debneyi*. There is every indication that transfers from such distant relatives, once established in tobacco, can be used far more rapidly and with fewer complications affecting type, yield, and quality than is the case with any resistance found within the cultivated species itself.

APPLE (J. L.) & LUCAS (G. B.). **Effectiveness of various field inoculation procedures in testing Tobacco for black shank resistance.**—Abs. in *Phytopathology*, 43, 5, p. 289, 1953.

Over a three-year period field tobacco plants were inoculated by various methods [at the North Carolina Agricultural Experiment Station] with *Phytophthora parasitica* var. *nicotianae* in order to find a standard technique for the measurement of resistance in different breeding lines [*R.A.M.*, 32, p. 217, and preceding abstract], using (1) pure cultures of the fungus grown on sterilized oat grains, (2) aqueous zoospore suspensions, and (3) infected plant material. Either root or stem inoculations were performed at or after transplanting on a susceptible, a moderately resistant, and a highly resistant variety. The most effective procedure for the separation of moderately from highly resistant lines was inoculation with oat cultures at transplanting time in soil of an ample moisture content at an average temperature of 68° F.

WOLF (F. T.). **Toxin production in relation to Tobacco black shank disease.**—Abs. in *Phytopathology*, 43, 5, p. 294, 1953.

Filtrates from cultures of *Phytophthora parasitica* var. *nicotianae* [see preceding abstracts], grown for a month or more in potato dextrose broth and other media

[? at Duke University, Durham, North Carolina], induced wilting of detached tobacco and tomato leaves. The toxin is almost entirely removable from the filtrates by adsorption on charcoal, not precipitable from solution by protein precipitants, insoluble in ether, dialysable, and partially thermostable. Samples of sap were prepared from healthy and diseased plants of Hicks tobacco, a portion of the infected extract being treated with charcoal. All the samples caused wilting of tobacco and tomato leaves within one hour. On transference to distilled water the wilted leaves previously exposed to healthy sap and charcoal-treated extract recovered, but not those subjected to untreated infected sap.

Orellana (R. G.). **Copper sulphate for the control of damping-off in Tobacco seedbeds.**—*Phytopathology*, 43, 3, pp. 125–127, 1 fig., 1 graph, 1953.

Damping-off of Virginia and Burley tobacco, associated with infection by *Corticium solani*, *Pythium* spp. [*R.A.M.*, 31, p. 33], *Fusarium* spp., and (in a few instances) *Sclerotium* spp., is responsible for severe losses in Venezuelan seed-beds, especially in the rainy season. The application of an aqueous solution of copper sulphate to the soil at the rate of 30 gm. per sq. m. arrested the spread of the disease. At 50 or 100 gm. the compound caused an excessive reduction in germination and was toxic to the seedlings; 20 gm. per sq. m. gave only temporary control. Transplants from the beds treated with 30 and 50 gm. copper sulphate developed normally, while those that had received 100 gm. remained stunted.

Hyre (R. A.). **Aerial dissemination of the Tobacco blue mold fungus.**—*Plant Dis. Reptr*, 37, 8, p. 447, 1953. [Multilithed.]

In further studies at the University of Delaware Experimental Farm, Newark, on aerial dissemination of tobacco blue mould (*Peronospora tabacina*) [*R.A.M.*, 32, p. 105] infection was found on 15th June, 1953, in a new plant bed. Precautions had been taken to eliminate any local source of inoculum. The nearest plant beds, about 20 air miles away near Homeville, Pennsylvania, were free from the disease on 16th June and only one bed with blue mould was reported from Lancaster County. A planting of an ornamental species of *Nicotiana* at Newark was not infected. It is concluded that inoculum for the infection at Newark was again wind-borne for at least 20 miles.

Hirayama (S.). **Artificial immunization against Tobacco mosaic disease by formalized virus.**—*Forsch. PflKr., Kyoto*, 4, pp. 35–45, 1951. [Japanese, with English summary. Received 1952.]

In studies in Japan clarified sap taken from tobacco plants infected with tobacco mosaic virus was treated with an aqueous solution (0·35 per cent. to 3·5 per cent.) of formaldehyde and dabbed on half leaves of young tobacco or *Nicotiana glutinosa* plants. Sap taken from these plants after a few days was inoculated into healthy plants which developed a short-lived immunity from mosaic symptoms.

Nariani (T. K.) & Singh (N.). **A mosaic disease of Nicotiana glauca R. Grah.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 47–51, 5 figs., 1953.

In March, 1951, a disease characterized by dark green mosaic leaf mottling (either raised in blisters or running parallel to the veins as raised green vein-banding), leaf dwarfing, malformation, and wavy margins affected about 20 per cent. of the *Nicotiana glauca* [cf. *R.A.M.*, 9, p. 260] plants in the Botany Division of the Indian Agricultural Research Institute, New Delhi. In 1952 40 per cent. of the plants were affected.

In host range, determined by sap transmission to twelve different host plants, and in physical properties the virus showed a close resemblance to *Cucumis*

virus 1 [cucumber mosaic virus: 29, pp. 140, 198], but differed in the low dilution end point (1 in 100 to 1 in 200).

HOLMES (F. O.). **Submutants from nonsystemic mutant strains of Tobacco-mosaic virus.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 8–16, 1 diag., 1953.

Studies at the Rockefeller Institute for Medical Research, New York, supported the view that the infectivity of tobacco mosaic virus and its ability to spread systemically in infected tobacco are either closely linked or are controlled by a single mechanism, since they mutated only simultaneously and not independently as commonly occurs with other characters of the virus [*R.A.M.*, 16, p. 129 *et passim*].

A single-lesion isolate of the green-mottling, 'distorting' strain [loc. cit.] was the inoculum source for young Turkish tobacco plants. Virus transfers were made from atypical, yellow or partly necrotic spots by pin-pricks to healthy plants of the same kind. Two mutant strains, 1933 B and 1940 F, that tended to remain localized, were transferred to new Turkish seedlings every 10 to 12 days, always from plants not showing submutant strains. Samples of submutant strains derived from the two original mutant stocks were preserved in infected leaf fragments. The infectivity of submutant strains and isolates was tested on *Nicotiana glutinosa*.

Twenty variants appearing in 136 plants inoculated with strain 1933 B, which produced unusual lesions often ringed with delicate white, necrotic lines and becoming yellow only in late stages, were practically all of the same general type as the parent green-mottling, distorting strain. The sole exception, 1933 B4, produced a spotty green, systemic mottle similar to Jensen's isolate 104 [16, p. 418]. The submutants were all far more infective than the original non-systemic strains. No variants appeared in the corresponding set of 136 plants inoculated with the yellow-spot strain 1940 F. Minor differences from the original strain, chiefly in the intensity of chlorosis, degree of puckering of young leaves, and the tendency to necrotic flecking in old leaves, were apparent when the 20 variants derived from 1933 B were retested on Turkish seedlings.

GÄUMANN (E.) & NAEF-ROTH (S.). **Über einen mutmaßlichen Desensibilisierungseffekt bei einem Welketoxin.** [On an apparent desensitization effect of a wilt toxin.]—*Phytopath. Z.*, 20, 2, pp. 133–166, 8 graphs, 1952.

The results of further experiments at the Federal Technical Institute, Zürich, showed that the sensitivity of cut shoots of Tuckswood tomato plants to lycomarasmin [*R.A.M.*, 32, p. 270, and next abstracts] varies with the moment when the toxin begins to act on the shoots after their amputation. This operation induces a traumatic sensitization to lycomarasmin, which is reversed, however, by the application of a second dose of the toxin 24 hours after the first. The desensitization effect does not function unless the initial dose of the toxin exceeds a certain threshold value ranging from 10 to 40 mg. per kg. fresh weight according to the season.

A theory is advanced to explain the physiological basis of the desensitization process.

GÄUMANN (E.) & NAEF-ROTH (S.). **D'un cycle annuel de la sensibilité des Tomates aux toxines.** [On an annual cycle of the sensitivity of Tomatoes to toxins.]—*C.R. Acad. Sci. Paris*, 236, 2, pp. 170–172, 2 graphs, 1953.

During each month of 1951, 20 Tuckswood tomato plants maintained under controlled environmental conditions were treated with 150 mg. per kg. fresh weight of lycomarasmin [see preceding and next abstracts]. The sensitivity of the plants (evaluated after 49 hours) was three times greater in December than in July, presupposing a correlation between the different degrees of sensitivity to the toxin and variations in the supply of light.

Scheffer (R. P.) & Walker (J. C.). **The physiology of Fusarium wilt of Tomato.**—*Phytopathology*, 43, 3, pp. 116–125, 2 figs., 2 graphs, 1953.

In experiments at the Department of Plant Pathology, University of Wisconsin, Madison, *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* induced significant reactions in the vascular system of Bonny Best tomato plants preceding or accompanying external symptoms. The fungus was generally present in wilting leaf petioles and frequently also in the foliage before the appearance of symptoms. In comparative experiments on the ability of transpiring diseased and healthy plants to conduct dye solutions freehand sections of stems and petioles showed that many vessels in diseased plants failed to conduct the dye. From these and other observations it is concluded that vascular occlusion [*R.A.M.*, 33, p. 56], especially in the petioles, is the proximate cause of wilt.

Crude culture filtrates of all ages caused injury to the leaf blades of cuttings, but no vascular symptoms within 24 hours, whereas both browning and obstruction developed in dilute filtrates from young cultures after three or four days. The same effects, with little leaf blade injury, followed exposure to filtrates of replacement cultures (the original medium was replaced by fresh after a dense mat had formed); the active component was shown by preliminary studies to be thermolabile and non-dialysable. Dilute suspensions of macromolecular polysaccharides caused vascular occlusion but no browning, while those with small molecules, which cause leaf blade injury, were innocuous to the vascular tissue [28, p. 363]. The plugging effect is tentatively attributed to increased viscosity of the fluids. Lycomarasmin [see preceding and next abstracts] induced neither vascular symptoms nor typical wilt, and several other lines of evidence are presented to support the view that it is not the principal agent of *Fusarium* wilt [see above, p. 106], in particular, the fact that the disease is essentially the same in normal and iron-deficient plants.

Waggoner (P. E.) & Dimond (A. E.). **Role of chelation in causing and inhibiting the toxicity of lycomarasmin.**—*Phytopathology*, 43, 5, pp. 281–284, 1 fig., 2 graphs, 1953.

The combination of lycomarasmin [see preceding abstract] and iron has been shown to be ten times as toxic to tomato cuttings as the antibiotic alone [*R.A.M.*, 30, p. 85]. In further studies at the Connecticut Agricultural Experiment Station [33, p. 56 and next abstract] the addition of 8-quinolinol, which forms a stable chelate complex with iron, to a mixture of lycomarasmin and a limited amount of ferrous or ferric ions, caused a decrease in toxicity of the antibiotic. Similar results were obtained with cupric ions, which form a chelate complex with lycomarasmin, in mixtures of ferrous or ferric ions and a limited quantity of lycomarasmin. Evidently, therefore, the lycomarasmin complex with iron is less stable than the same mixture with copper, and furthermore, the antibiotic must act as the iron complex. Neither the 8-quinolinol nor the copper ion inhibitor of lycomarasmin retarded the development of wilt symptoms caused by *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* in tomato leaves [loc. cit. and preceding abstracts], nor did the iron ion accelerate their expression. It is concluded, therefore, that lycomarasmin is not an important factor in the symptomatology of the disease.

Davis (D.) & Dimond (A. E.). **Inducing disease resistance with plant growth-regulators.**—*Phytopathology*, 43, 3, pp. 137–140, 1953.

Investigations at the Connecticut Agricultural Experiment Station demonstrated the chemotherapeutic activity against tomato wilt (*Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici*) [*R.A.M.*, 32, p. 517, and preceding and next abstracts] of the growth-regulators 2, 4-D, α-naphthaleneacetic acid, 2-3-5-tri-

iodobenzoic acid, β-naphthoxyacetic acid, and indole-3-acetic acid [cf. 30, p. 239]. The fungitoxicity of these substances *in vitro* was relatively low, but when applied to the leaves four or ten days before inoculation the disease was reduced or prevented. Symptomatic of the changes in host metabolism induced by these growth-regulators were formative effects, reduced weight, and a decrease in the reducing sugar content of the tissues. The longer the interval (up to 10 days) between treatment and inoculation the more potent was the chemotherapeutic effect.

Davis (D.), Waggoner (P. E.), & Dimond (A. E.). **Conjugated phenols in the Fusarium wilt syndrome.**—*Nature, Lond.*, 172, 4386, pp. 959–961, 1 graph, 1953.

Initial experiments at the Connecticut Agricultural Experiment Station, New Haven, in co-operation with the Crop Protection Institute, concerning the discoloration caused in tomato by the wilt fungus *Fusarium oxysporum* f. [*bulbigenum* var.] *lycopersici* [see preceding abstracts] demonstrated that certain phenols, notably orthopolyphenols, are capable of discolouring the vascular bundles of tomato stems. Sap exuded by root pressure from the stumps of diseased plants contained more phenols than sap from healthy plants and was discoloured by mushroom phenoloxidase. However, neither phenols nor phenoloxidase were detected in the culture filtrate obtained by growing the wilt organism on an inorganic salt-glucose medium. *F. bulbigenum* var. *lycopersici* utilized salicin and tannic acid as the sole source of carbon on Czapek's inorganic nutrient, suggesting that the pathogen produces hydrolytic enzymes which liberate phenols from β-glucosides and tannins. A β-glucosidase capable of splitting salicin was detected in the sap of diseased plants, but not in that of healthy ones.

It is concluded that the phenols found in the vascular sap of wilted plants could arise by hydrolysis of β-glucosides in the host. The carbohydrate fraction freed from the conjugated phenol might possibly function in the characteristic wilting mechanism. It is significant that if the base of a healthy tomato cutting is placed in a small volume of distilled water the stem develops vascular discoloration. All the components of the system responsible for vascular discoloration could conceivably arise from the host, the pathogen disrupting the host cells and liberating into the vascular system the substances responsible for wilt symptoms.

Swank (G.). **The perfect stage of Colletotrichum phomoides on Tomato.**—*Phytopathology*, 43, 5, pp. 285–287, 1 fig., 1953.

In the course of a study at the Department of Botany and Plant Pathology, Ohio State University, on the variability of monospore isolates of *Colletotrichum phomoides* [cf. *R.A.M.*, 27, p. 392] a strain was detected forming perithecia, asci, and ascospores in culture on 2 per cent. potato dextrose agar. Single ascospore cultures were inoculated into tomato, bean (*Phaseolus vulgaris*), pepper (*'Solanum piperatum'*), and apple fruits with positive results. The lesions developing on tomatoes were similar to those caused by known conidial strains of the fungus, while those on apple were light brown and soft, becoming watery. The reisolations from the tomato fruits were identical with the original isolate used as inoculum, and they also gave rise to perithecia, which were not observed in the diseased fruits themselves. The foliage of Rutgers tomato seedlings was atomized with a suspension from a mono-ascospore culture and maintained for 24 hours at a constant temperature of 26° C. and 100 per cent. humidity. Five days later small, circular, brown, necrotic lesions developed on the leaves, often coalescing at the leaflet tips, where signs of die-back were also apparent.

It was concluded from these observations that the imperfect strain of the fungus, which was inoculated into a tomato fruit, mutated there to a strain which produced sexual organs in culture.

The perithecia, forming singly or in groups after 14 to 18 days in culture, are irregular, 130 to 242 by 93 to 180 μ, with beaked, hairy ostioles and brownish-black, membranous walls. The hyaline asci, 56 to 112 μ long, contain eight oval to elliptical, straight, hyaline, uninucleate spores, 15 to 19 by 5 to 7 μ, forming one or two septa on germination. This perfect state of the fungus is designated *Glomerella phomoides* n.sp.

GILLARD (S. O.). **Growing Tomatoes in glasshouses. Parts I and II.**—*N.Z.J. Agric.*, 86, 5, pp. 402–405, 407, 409, 411–412; 6, pp. 513–515, 517–519, 521, 523, 525–526, 28 figs., 4 diags., 1953.

Part I of this paper on glasshouse cultivation of tomatoes in New Zealand includes sections on seed disinfection and soil sterilization by steam and chemicals. In part II information on some common diseases and their control is summarized, most of which has already been noticed from other sources [*R.A.M.*, 29, pp. 178, 233; 31, pp. 521, 522; 32, pp. 595, 648].

ZUCKERMAN (B. M.) & CURL (E. A.). **Proof that the fungus pads on Oak wilt-killed trees are a growth form of Endoconidiophora fagacearum.**—*Phytopathology*, 43, 5, pp. 287–288, 1 fig., 1953.

In recent studies at the Illinois State Natural History Survey, Urbana, the oak wilt fungus (*Endoconidiophora fagacearum*) [*Chalara quercina*: *R.A.M.*, 32, p. 701, and next abstracts] was grown on a medium of 20 gm. ground Chinese chestnut in 100 ml. water. In unshaken flasks it produced thick, circular, partially submerged pads covered by a mycelium of varying density. Shaken cultures gave rise, in addition to conidia, to large numbers of cells similar to those composing the pad, distributed singly or in clusters of two to four throughout the flask. The pads formed in culture resembled those collected in nature, e.g., in the daedaloid surface pattern and deep rifts, and in colour and texture too. In field material also there were thin-walled, inflated, irregular or ovoid to sphaeroidal cells, 16 by 13 to 62 by 40 μ, filled when young with a greenish cytoplasmic mass that disappeared as the pads aged. Numerous tan-coloured hyphae ramified among the cells, often swelling into large cells and mingling with the other components of the pad. Three out of nine cells separated by a streak-dilution technique produced on potato dextrose agar characteristic cultures of *C. quercina*, the pathogenicity of which was tested with positive results. On the basis of the results obtained the subcortical mats of *C. quercina* found in nature are considered to be a form of the fungus.

CAMPBELL (R. N.) & FRENCH (D. W.). **A possible selective medium for the Oak wilt fungus.**—*Plant Dis. Reptr*, 37, 7, p. 407, 1953. [Multilithed.]

At the Minnesota Agricultural Experiment Station, St. Paul, an agar medium, consisting of 20 gm. dry diamalt syrup, 15 gm. bacto-ox gall [cf. *R.A.M.*, 31, p. 514], and 15 gm. agar per l. water, was found to be the best selective medium for the growth of the oak wilt pathogen (*Endoconidiophora fagacearum*) [*Chalara quercina*: 32, p. 650, and preceding and next abstracts] in a mixed population of fungi. After five days at room temperature *C. quercina* formed submerged, compact colonies 2 to 3 mm. in diameter, producing typical endoconidia. Common moulds formed only small, discrete colonies. To maintain full effectiveness of the ox gall the number of colonies per plate should be kept low.

DORSEY (C. K.), JEWELL (F. F.), LEACH (J. G.), & TRUE (R. P.). **Experimental transmission of Oak wilt by four species of Nitidulidae.**—*Plant Dis. Reptr*, 37, 8, pp. 419–420, 1953. [Multilithed.]

Further experiments on the transmission of the oak wilt fungus (*Endoconidiophora fagacearum*) [*Chalara quercina*: *R.A.M.*, 32, p. 596, and preceding and next

abstracts] were carried out in 1952 and 1953 at West Virginia University, Morgantown. Infection was recorded in five of six oak trees inoculated on 6th May, 1953, by transferring *Calopterus semitectus*, *Glischrochilus sanguinolentus*, *G. confluentus*, and *Carpophilus lugubris* from cultures of the pathogen to wounded bark. Since these species normally visit wounded, healthy trees and were regularly found on mycelial mats, it is concluded that they are important vectors of the disease in nature.

Norris (D. M.). **Insect transmission of Oak wilt in Iowa.**—*Plant Dis. Reptr*, 37, 8, pp. 417–418, 1953. [Multilithed.]

In preliminary studies on the insect transmission of oak wilt (*Endoconidiophora fagacearum*) [*Chalara quercina*: see preceding abstracts] conducted in 1953 at Pilot Knob State Park, Forest City, Iowa, 15 red oaks [*Quercus* spp.] of all ages were wounded with a sterilized tool and two to four individuals of *Glischrochilus sanguinolentus*, *G. fasciatus*, *G. quadrisignatus*, or *Epurea corticina*, collected from fungus mats and pads with abundant perithecia, were caged on the damaged bark. The results showed that as few as two beetles could carry a load of inoculum sufficient to establish infection in a fresh wound within three weeks.

Vincent (M[argaret]). **A Chalaropsis on Beech.**—*Nature, Lond.*, 172, 4386, pp. 963–964, 1953.

An undescribed species of *Chalaropsis* was found in April, 1952, producing an abundance of black spores under the bark of a recently felled beech in Knole Park, Sevenoaks, Kent. Interspersed with the spore sludge were *Ceratocystis* perithecia which were also produced in culture at Birkbeck College, London, and shown to be connected with the *Chalaropsis*. Woodlice, commonly observed beneath the bark of affected felled trees, leave a frass consisting largely of viable thallospores of *Chalaropsis*. Although there is no definite evidence that the fungus attacks living trees, field observations have shown an initial infection of wounds in standing trees. Occasionally the *Chalaropsis* and more frequently the accompanying *Ceratocystis* spp. are parasitized by *Gonatobotryum fuscum* [cf. *R.A.M.*, 29, p. 443].

Imazeki (R.). **Cryptoderma pini (Brot. ex Fr.) Imazeki and C. yamanoi Imazeki.**—*Forsch. PflKr., Kyoto*, 4, pp. 174–177, 1951. [Japanese summary. Received 1952.]

The author agrees with previous workers in Japan that the fungus causing white pocket rot of spruce (*Picea jezoensis*) [cf. *R.A.M.*, 32, p. 411] in northern Hokkaido is not *Fomes pini*, which is not present on the island but does attack larch (*Larix kurilensis*) in Sakhalin. He considers, however, that both fungi should more properly be placed in his genus *Cryptoderma* (*Bull. Tokyo sci. Mus.* 6, p. 106, 1943) and resuscitates the combination *C. pini* [loc. cit.] for *F. pini*, giving full synonymy. *Cryptoderma yamanoi* nom. nov. is proposed for the spruce fungus instead of *F. jezoensis*, as Yamano's original description (*Goryorin*, 25, p. 70, 1930) is considered invalid and the name a nomen nudum. *F. pini* differs from *C. yamanoi* in having a very dark brown context with an indistinctly stratified hymenophore, while *C. yamanoi* has a yellow-brown context and distinctly stratified hymenophore. The spores of *F. pini* are hyaline, while those of *C. yamanoi* become brown.

Davidson (R. W.) & Lombard (Frances F.). **Large-brown-spored house-rot fungi in the United States.**—*Mycologia*, 45, 1, pp. 88–100, 4 figs., 1953.

Descriptions are given of the growth characters of plate cultures, hyphal characteristics, appearance of agar slopes of, and type of decay caused by *Merulius americanus*, *Poria incrassata*, and *M. lacrymans*, with a key to identification and

the 'key pattern' [*R.A.M.*, 21, p. 396] of each species and a note on temperature relations. Cultures of *M. lacrymans* may be distinguished by their slow growth (3 to 5 cm. in two weeks) on 2 per cent. malt agar; odour is faint or lacking; growth is best at about 18° C. and there is none at 28°. *M. americanus* grows 6 to 9 cm. in two weeks, best at 26°, well at 30°, and slightly at 34°, and has an unpleasant penetrating odour. Both species are occasionally found in houses; the latter is common on fallen pine logs near Beltsville, Maryland.

Destructive decay in houses in the United States is caused by *Coniophora puteana* and *Poria incrassata*. The former grows more than 9 cm. in two weeks and has a buff to brown mycelium, while the latter grows only 6 to 9 cm. and has a silky white mycelium. The temperature requirements of both are similar to those of *M. americanus*.

Bletchly (J. D.). **The influence of decay in timber on susceptibility to attack by the common furniture beetle, Anobium punctatum De G.**—*Ann. appl. Biol.*, 40, 1, pp. 218–221, 1953.

In experiments at the Forest Products Research Laboratory, Princes Risborough, Bucks., there was much greater gain in weight by larvae of *Anobium punctatum* in sapwood of beech, Turkey oak (*Quercus cerris*), pine (*Pinus sylvestris*), and walnut (*Juglans regia*) decayed by *Polystictus versicolor* (after artificial inoculation) than in sound wood. Gain in weight was related to extent of decay, but appeared to attain a maximum in moderately decayed wood. In pine a loss in weight of only 8 per cent. increased larval growth. With *Coniophora cerebella* in beech the relation between rot and larval weight under incubator conditions appeared to follow very similar lines to that for *P. versicolor* for the lower losses in weight. The evidence indicated that decayed wood is more suitable than sound for egg laying and initial larval penetration. The survival rate of larvae in wood affected by white rots is generally lower than in undecayed, but in pine decayed in an incubator to approximately 8 per cent. loss in weight, and in walnut decayed out of doors to about 29 per cent. loss, the survival rate was higher than in the controls. The survival rate appears to be much lower in brown-rot wood than in white rot, and possibly depends on an essential food constituent of the wood, such as cellulose. The increased rate of larval growth does not appear to curtail the life-cycle.

Observations in buildings have shown the effects of fungi (sometimes not of the wood-destroying kind) in facilitating attack by *A. punctatum* in heartwood; as this insect is usually confined to sapwood, this observation is of importance. Decayed heartwood may be preferred by the insect to sound sapwood; for example, in a board of *Sorbus aucuparia* the heartwood decayed by *Armillaria mellea* was attacked severely and the sound sapwood only slightly.

In the incubator no larvae survived in freshly seasoned pine, whether sound or decayed by *C. cerebella*; but they survived in oak (*Q. robur*) decayed by *Phellinus cryptarum* [*R.A.M.*, 16, p. 4; cf. 31, p. 154], though not in the controls. Out of doors, however, beetles emerged in the summer of 1952 from freshly seasoned oak decayed by *P. cryptarum* to 36 per cent. loss in weight and also from sound wood.

Preliminary experiments on walnut inoculated with *Paecilomyces varioti* and *Chaetomium globosum* [33, p. 60] indicated that while larvae do not appear to develop more rapidly than in the controls, the percentage survival is higher.

Wijewantha (R. T.). **List of fungal sporophores in the Forest Department Herbarium.**—*Ceylon Forest.*, N.S., 1, 2, pp. 109–111, 1953.

Among the fungi not already recorded for Ceylon [*R.A.M.*, 30, p. 55] included in this list are *Ganoderma pseudoferreum* on *Acacia melanoxylon* and *Eucalyptus microcorys*; *Polystictus sanguineus* [32, p. 157] on *Chloroxylon swietenia*, *Hemi-*

cyclia sepiaria, and *Campnosperma zeylanicum*; and *Trametes angulata* on *Chloroxylon swietenia*.

Sedziak (H. P.). **The evaluation of two modern wood preservatives.**—*J. For. Prod. Res. Soc.*, 2, 5, pp. 260–268, 1952. [Received December, 1953.]

In this report on tests of pentachlorophenol and copper naphthenate for determination of their wood-preserving value [cf. *R.A.M.*, 32, p. 654; 33, p. 62] the methods and results of tests carried out since 1944 [27, p. 343] in the Ottawa Laboratory of the Forest Products Laboratories Division, Canada, are described. Stakes of red pine [*Pinus resinosa*] sapwood ¾ by ¾ by 42 in. with various absorptions of the two preservatives were subjected to laboratory weathering and accelerated decay tests. The effective concentrations appear similar and are dependent on the solvent, fuel oil being considerably more effective than varsol (mineral spirits), on the type of weathering, and the decay hazard. When varsol was the solvent the threshold value per cu. ft. for pentachlorophenol was 0·1 to 0·2 lb. and for copper naphthenate 0·1 lb. metallic copper. Information is presented on the technique and reliability of accelerated decay tests [loc. cit.], which cause an attack equal to about five years natural decay and are considered to give an accurate assessment of the value of a preservative.

Luthardt (W.). **Biologische Stubbenrodung.** [Biological stump eradication.]—Reprinted from *Wald*, 2, 4 pp., 8 figs., 1952. [Received November, 1953.]

From Thuringia, Germany, the author reports on the encouraging results obtained in over 15,000 experiments in biological (as opposed to mechanical) stump eradication, especially of hardwoods. The stumps are inoculated with edible fungi, e.g., *Pholiota mutabilis* or *Pleurotus ostreatus*, which produce luxuriant crops for several years from the second year onwards. In 1½ to three years after inoculation the wood acquires a consistency suitable for various technical purposes, such as the manufacture of pencils, and after four to 12 years disorganization is complete. Similar untreated material takes 30 to 40 years to disintegrate.

Narayanamurti (D.) & Verma (G. M.). **Studien zur Biochemie holzzerstörender Pilze — Dritte Mitteilung. Cellulase und Invertase von Polystictus sanguineus und über die mögliche Wirkungsmechanik von Holzschutzmitteln.** [Studies on the biochemistry of wood-destroying fungi—third note. Cellulase and invertase of *Polystictus sanguineus* and on the possible mechanism of the action of wood preservatives.]—*Holz a. Roh- u. Werkst.*, 11, 1, pp. 7–9, 8 graphs, 1953.

In this further series of experiments in India on the biochemistry of wood-destroying fungi [*R.A.M.*, 32, p. 351], using wood blocks of *Shorea robusta* and *Pinus longifolia*, the optimum pH and temperature for invertase activity in *Polystictus sanguineus* [32, p. 411] were found to be 4·7 and 36° C., respectively, for a reaction time of 24 hours, the corresponding values for cellulase being 5·2 to 5·4 and 33° for 14 days' reaction. Reaction time is influenced by the concentration of the enzymes. Coal tar oil and 4 per cent. ascu [32, p. 291] depressed enzyme action. Water extracts from sound wood reduced activity more than those from decayed material, but the reverse was true of acetic acid extracts.

Jacks (H.). **Disinfection of vegetable seeds.**—*N.Z. J. Agric.*, 87, 3, pp. 217–221, 223–224, 12 figs., 1953.

Most of this information on vegetable seed treatments in New Zealand has already been noticed from other sources [*R.A.M.*, 32, p. 328; 33, p. 63]. For small-scale application a box holding a number of jars (with seed plus fungicide) is rotated at 40 revolutions per minute by an electric motor. This speed has been found to give optimum coverage at the Plant Diseases Division, Auckland.

En ny mangelsygdom? Molybdenmangel gir fullstendig misdannelse av Blomkålplanter. [A new deficiency disease? Molybdenum deficiency leads to complete malformation of Cauliflower plants.]—Reprinted from *Gartneryrket, 1951*, 36, 7 pp., 2 figs., 1951.

In this report of an interview given to a representative of *Gartneryrket* by J. Roll-Hansen, of the State Experiment Station, Kvithamar, Stjørdal, Norway, it is stated that cauliflowers suffer locally from molybdenum deficiency [cf. *R.A.M.*, 33, p. 71]. In comparative tests on five varieties in 1951 the percentage of plants with definite molybdenum deficiency symptoms in unlimed plots was 5·6; in limed plots (1,000 kg. per decare [= 190·6 sq. yds.]) 6·5; unlimed, sprayed with ammonium molybdate (10 gm.) three times between the beginning of June and the beginning of July, 0·3; limed and sprayed, 0·5; ammonium molybdate applied to unlimed soil (50 gm.), 1·7; and to limed soil, 1·3. The total number of plants in the untreated plots was 3,650; sprayed with ammonium molybdate, 4,506; and grown in molybdenum-treated soil, 5,136.

Sylvester (E. S.). **Brassica nigra virus transmission. Some vector-virus-host plant relationships.**—*Phytopathology*, 43, 4, pp. 209–214, 1 graph, 1953.

Further studies at the Department of Entomology and Parasitology, University of California, Berkeley, on the transmission of *Brassica nigra* virus by *Myzus persicae* [*R.A.M.*, 31, p. 158], have shown that some experimental variations can be traced to differences among plants, insect colonies, and virus sources. Fairly consistent results were secured by the use of one aphid colony and a single leaf virus source for the inoculation of one group of uniform test plants within two hours on the same day. Although the aphids fed most frequently on the lower surface of *Brassica juncea* seedlings, the various tissue regions differed little in their reactions to infection. Susceptibility was not enhanced by 24 or 48 hours' maintenance in darkness before inoculation, nor were differences in this respect observed between plants of ages ranging from one to five weeks.

By means of aphids the course of active virus concentration was followed in single leaves of five plants for 15 days after symptom appearance, in one leaf of one plant from the same stage until death, a period of 27 days, and in several leaves of one plant for 16 days. The ratio of active virus to amount of tissue appeared to reach a maximum between 15 and 20 days after inoculation, active virus concentration in all the leaves evidently passing through a typical growth cycle. Under the experimental conditions selected it was at a low level in old leaves and moderately high in younger ones of the same plant.

Rezende-Pinto (M. C.) & Borges (Maria de L. V.). **L'action pathologique du virus de la mosaïque jaune du Navet sur les chloroplastes de Brassica chinensis L.** [The pathological action of the virus of Turnip yellow mosaic on the chloroplasts of *Brassica chinensis* L.]—*Agron. lusit.*, 14, 4, pp. 259–267, 3 pl., 1952. [Portuguese summary.]

In this joint contribution from the Botanical Institute, Oporto, and the National Agronomic Station, Sacavém, Portugal, the structural modifications in the chloroplasts of *Brassica chinensis* leaves resulting from inoculation with turnip yellow mosaic virus [*R.A.M.*, 29, p. 485] are described.

Three areas are distinguishable, a green, a semi-chlorotic, and a chlorotic. There was no appreciable abnormality in the granular structure of the chloroplasts in the green areas, but the vacuoles, in contrast to those of healthy plants, were uniformly full of starch even after 15 hours in total darkness. A similar condition was observed in the semi-chlorotic areas. In the definitely chlorotic parts some of the chloroplasts had lost their typical granular structure while others had retained it; the former are interpreted as representing the true amyloplasts or chloro-amyloplasts.

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Vol. XXXII, page 618, line 11, *for* 'lower than' *read* 'of'